CAS ONLINE PRINTOUT

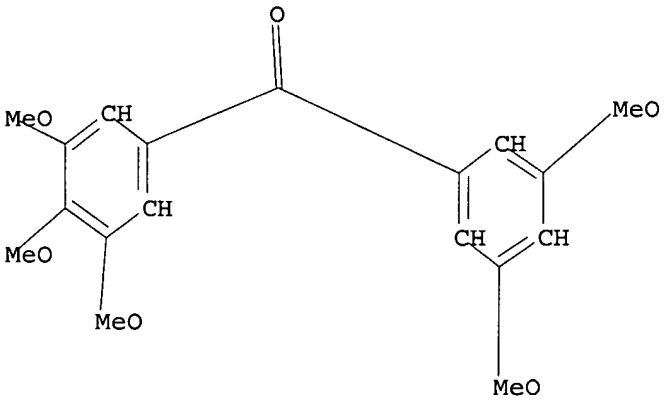
=> d his

(FILE 'HOME' ENTERED AT 07:29:06 ON 28 OCT 2003)

FILE 'REGISTRY' ENTERED AT 07:29:13 ON 28 OCT 2003
L1 STRUCTURE UPLOADED
L2 STRUCTURE UPLOADED
L3 1 S L2 CSS FUL

FILE 'BEILSTEIN' ENTERED AT 07:31:33 ON 28 OCT 2003
L4 1 S L2 FUL

=> d l2
L2 HAS NO ANSWERS
L2 STR



G1 Me,Et,n-Pr,i-Pr,P

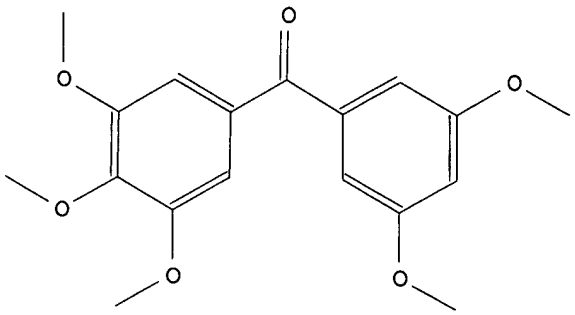
Structure attributes must be viewed using STN Express query preparation.

=> d all l4

L4 ANSWER 1 OF 1 BEILSTEIN COPYRIGHT 2003 BEILSTEIN CDS MDL on STN

Beilstein Records (BRN):	7940294
Chemical Name (CN):	3,3',4,5,5'-pentamethoxybenzophenone
Autonom Name (AUN):	(3,5-dimethoxy-phenyl)-(3,4,5-trimethoxy-phenyl)-methanone
Molec. Formula (MF):	C18 H20 O6
Molecular Weight (MW):	332.35
Lawson Number (LN):	10221, 289
Compound Type (CTYPE):	isocyclic
Constitution ID (CONSID):	6767165
Tautomer ID (TAUTID):	7492238
Beilstein Citation (BSO):	6-08
Entry Date (DED):	1998/11/09
Update Date (DUPD):	1998/11/09

CAS ONLINE PRINTOUT



Field Availability:

Code	Name	Occurrence
BRN	Beilstein Records	1
CN	Chemical Name	1
AUN	Autonomname	1
MF	Molecular Formula	1
FW	Formular Weight	1
LN	Lawson Number	2
FS	File Segment	1
CTYPE	Compound Type	1
CONSID	Constitution ID	1
TAUTID	Tautomer ID	1
BSO	Beilstein Citation	1
ED	Entry Date	1
UPD	Update Date	1
MP	Melting Point	1
MS	Mass Spectrum	1
PHARM	Pharmacological Data	1

This substance also occurs in Reaction Documents:

Code	Name	Occurrence
RX	Reaction Documents	1
RXPRO	Substance is Reaction Product	1

Melting Point:

Value (MP) (Cel)	Solvent (.SOL)	Ref.
121 - 122	hexane	1

Reference(s):

1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Mass Spectrum:

MS

Description (.KW): spectrum, electron impact (EI)

Reference(s):

1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard,

CAS ONLINE PRINTOUT

Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Pharmacological Data:
PHARM

Note(s) (.COM):	cytotoxic activity: inhibition of human tumor in the NCI 60 cell line; inhibition of bovine brain tubulin polymerization (IC50: 3.6 .my.M) and inhibition of colchicine binding to tubulin

Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Reaction:
RX

Reaction ID (.ID):	4886521
Reactant BRN (.RBRN):	2101952, 531040
Reactant (.RCT):	5-bromo-1,2,3-trimethoxy-benzene, 4-(3,5-dimethoxy-benzoyl)-morpholine
Product BRN (.PBRN):	7940294
Product (.PRO):	3,3',4,5,5'-pentamethoxybenzophenone
No. of React. Details (.NVAR):	1

Reaction Details:
RX

Reaction RID (.RID):	4886521.1
Reaction Classification (.CL):	Preparation
Reagent (.RGT):	1.) t-BuLi
Other Conditions (.COND):	1.) THF, -78 deg C, 15 min, 2.) THF, from -78 to -65 deg C, 4 h
Note(s) (.COM):	Yield given. Multistep reaction

Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

=> file reg

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	83.82	236.02

FILE 'REGISTRY' ENTERED AT 07:32:48 ON 28 OCT 2003

Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

STRUCTURE FILE UPDATES: 27 OCT 2003 HIGHEST RN 609766-09-8
DICTIONARY FILE UPDATES: 27 OCT 2003 HIGHEST RN 609766-09-8

TSCA INFORMATION NOW CURRENT THROUGH JULY 14, 2003

Please note that search-term pricing does apply when conducting SmartSELECT searches.

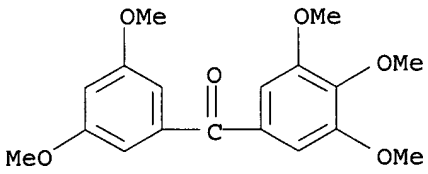
Crossover limits have been increased. See HELP CROSSOVER for details.

CAS ONLINE PRINTOUT

Experimental and calculated property data are now available. See HELP PROPERTIES for more information. See STNote 27, Searching Properties in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

=> d l3 ide bib

L3 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2003 ACS on STN
RN 203448-37-7 REGISTRY
CN Methanone, (3,5-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)
OTHER NAMES:
CN 1-(3,5-Dimethoxybenzoyl)-3,4,5-trimethoxybenzene
FS 3D CONCORD
MF C18 H20 O6
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPATFULL



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

2 REFERENCES IN FILE CA (1907 TO DATE)
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1

AN 131:73506 CA
TI Synthesis and formulation of phenstatin and related prodrugs for use as antitumor agents
IN Pettit, George R.; Toki, Brian
PA Arizona State University, USA
SO PCT Int. Appl., 39 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9934788	A1	19990715	WO 1999-US475	19990109
	W: CA, JP, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2314510	AA	19990715	CA 1999-2314510	19990109
	EP 1045689	A1	20001025	EP 1999-902133	19990109
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, FI				
	JP 2002500184	T2	20020108	JP 2000-527239	19990109
PRAI	US 1998-70878P	19980109			
	WO 1999-US475	19990109			

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

REFERENCE 2

CAS ONLINE PRINTOUT

AN 128:230173 CA
TI Antineoplastic Agents. 379. Synthesis of Phenstatin Phosphate
AU Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; Hamel, Ernest; Pettit, Robin K.
CS Cancer Research Institute and Department of Chemistry, Arizona State University, Tempe, AZ, 85287-1604, USA
SO Journal of Medicinal Chemistry (1998), 41(10), 1688-1695
CODEN: JMCMAR; ISSN: 0022-2623
PB American Chemical Society
DT Journal
LA English

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CAS ONLINE PRINTOUT

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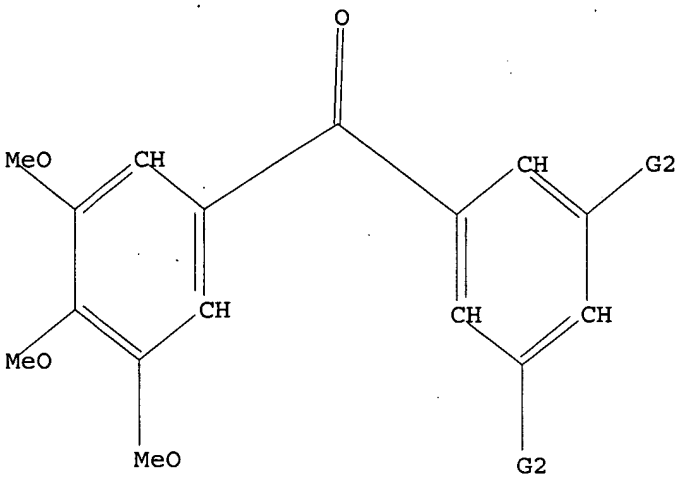
L1 HAS NO ANSWERS
L1 STR



G1 Me,Et,n-Pr,i-Pr,P
G2 Cl,F,Me

Structure attributes must be viewed using STN Express query preparation.

=> s l1 ful
FULL SEARCH INITIATED 09:47:32 FILE 'REGISTRY'
FULL SCREEN SEARCH COMPLETED - 387 TO ITERATE

100.0% PROCESSED 387 ITERATIONS 3 ANSWERS
SEARCH TIME: 00.00.01

L3 3 SEA SSS FUL L1

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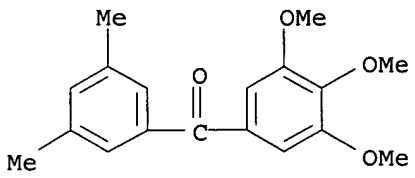
L3 ANSWER 1 OF 3 REGISTRY COPYRIGHT 2003 ACS on STN
RN 229027-05-8 REGISTRY
CN Methanone, (3,5-dimethylphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)
FS 3D CONCORD
MF C18 H20 O4
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPATFULL



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

1 REFERENCES IN FILE CA (1907 TO DATE)

CAS ONLINE PRINTOUT

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

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AN 131:73506 CA
TI Synthesis and formulation of phenstatin and related prodrugs for use as antitumor agents
IN Pettit, George R.; Toki, Brian
PA Arizona State University, USA
SO PCT Int. Appl., 39 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9934788	A1	19990715	WO 1999-US475	19990109
	W: CA, JP, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2314510	AA	19990715	CA 1999-2314510	19990109
	EP 1045689	A1	20001025	EP 1999-902133	19990109
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, FI				
	JP 2002500184	T2	20020108	JP 2000-527239	19990109
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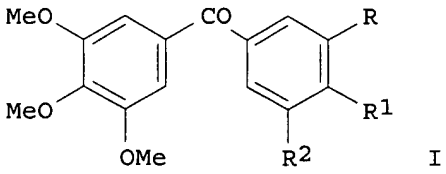
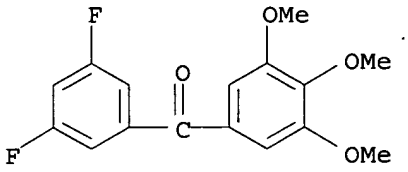


I

AB Phenstatin I (R = H, R1 = OMe, R2 = OH) and related prodrugs I [R = H, OMe, Me, Cl, F; R1 = H, OMe; R2 = OPO3Na2, OPO3H2, OAc, OMe, Me, Cl, F; R1R2 = OCH2O] were prepd. and formulated for use as antineoplastic agents. Thus, phenstatin was converted to the sodium phosphate prodrug I (R = H, R1 = OMe, R2 = OPO3Na2) by a dibenzylphosphite phosphorylation and subsequent hydrogenolysis sequence. Phenstatin was found to be a potent inhibitor of tubulin polymn. and the binding of colchicine to tubulin comparable to combretastatin A-4.
RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 2 OF 3 REGISTRY COPYRIGHT 2003 ACS on STN
RN 203448-39-9 REGISTRY
CN Methanone, (3,5-difluorophenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)
OTHER NAMES:
CN 1-(3,5-Difluorobenzoyl)-3,4,5-trimethoxybenzene
FS 3D CONCORD
MF C16 H14 F2 O4
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPATFULL

CAS ONLINE PRINTOUT



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IN Pettit, George R.; Toki, Brian
PA Arizona State University, USA
SO PCT Int. Appl., 39 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9934788	A1	19990715	WO 1999-US475	19990109
	W: CA, JP, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2314510	AA	19990715	CA 1999-2314510	19990109
	EP 1045689	A1	20001025	EP 1999-902133	19990109
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, FI				
	JP 2002500184	T2	20020108	JP 2000-527239	19990109
PRAI	US 1998-70878P	19980109			
	WO 1999-US475	19990109			

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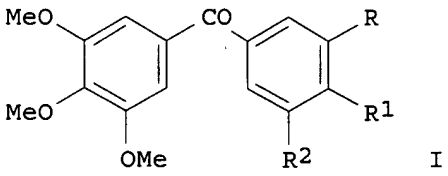

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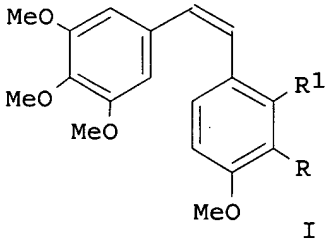
AB Phenstatin I (R = H, R1 = OMe, R2 = OH) and related prodrugs I [R = H, OMe, Me, Cl, F; R1 = H, OMe; R2 = OPO3Na2, OPO3H2, OAc, OMe, Me, Cl, F; R1R2 = OCH2O] were prepd. and formulated for use as antineoplastic agents. Thus, phenstatin was converted to the sodium phosphate prodrug I (R = H, R1 = OMe, R2 = OPO3Na2) by a dibenzylphosphite phosphorylation and subsequent hydrogenolysis sequence. Phenstatin was found to be a potent inhibitor of tubulin polymn. and the binding of colchicine to tubulin comparable to combretastatin A-4.

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

CAS ONLINE PRINTOUT

REFERENCE 2

AN 128:230173 CA
TI Antineoplastic Agents. 379. Synthesis of Phenstatin Phosphate
AU Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; Hamel, Ernest; Pettit, Robin K.
CS Cancer Research Institute and Department of Chemistry, Arizona State University, Tempe, AZ, 85287-1604, USA
SO Journal of Medicinal Chemistry (1998), 41(10), 1688-1695
CODEN: JMCMAR; ISSN: 0022-2623
PB American Chemical Society
DT Journal
LA English
GI



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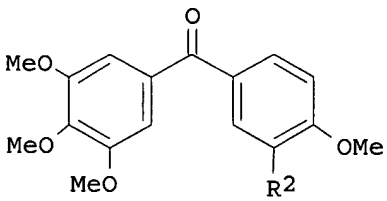

II

AB A structure-activity relationship (SAR) study of the South African willow tree (Combretum caffrum) antineoplastic constituent combretastatin A-4 (I; R = OH, R1 = H) directed at maintaining the (Z)-stilbene relationship of the olefin di-Ph substituents led to synthesis of a potent cancer cell growth inhibitor designated phenstatin (II; R2 = OH). Initially phenstatin silyl ether (II; R2 = OSiMe2CMe3) was unexpectedly obtained by Jacobsen oxidn. of combretastatin A-4 silyl ether (I; R = OSiMe2CMe2, R1 = H), and the parent phenstatin (II; R2 = OH) was later synthesized in quantity. Phenstatin was converted to the sodium phosphate prodrug [II; R2 = OP(O)(ONa)2] by a dibenzyl phosphite phosphorylation and subsequent hydrogenolysis sequence. Phenstatin (II; R2 = OH) inhibited growth of the pathogenic bacterium Neisseria gonorrhoeae and was a potent inhibitor of tubulin polymn. and the binding of colchicine to tubulin comparable to combretastatin A-4 (I; R = OH, R1 = H). Interestingly, the prodrugs were found to have reduced activity in these biochem. assays. While no significant tubulin activity was obsd. with the phosphorylated deriv. of combretastatin A-4 (I; R = OH, R1 = H), phosphate II [R2 = OP(O)(ONa)2] retained detectable inhibitory effects in both assays.
RE.CNT 53 THERE ARE 53 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 3 OF 3 REGISTRY COPYRIGHT 2003 ACS on STN
RN 203448-38-8 REGISTRY
CN Methanone, (3,5-dichlorophenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)
OTHER NAMES:
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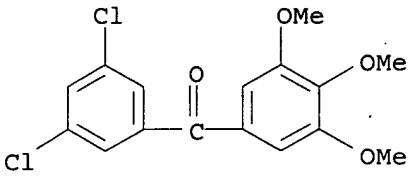
FS 3D CONCORD
MF C16 H14 Cl2 O4
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPATFULL

CAS ONLINE PRINTOUT



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REFERENCE 1

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IN Pettit, George R.; Toki, Brian
PA Arizona State University, USA
SO PCT Int. Appl., 39 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9934788	A1	19990715	WO 1999-US475	19990109
	W: CA, JP, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2314510	AA	19990715	CA 1999-2314510	19990109
	EP 1045689	A1	20001025	EP 1999-902133	19990109
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, FI				
	JP 2002500184	T2	20020108	JP 2000-527239	19990109
PRAI	US 1998-70878P	19980109			
	WO 1999-US475	19990109			

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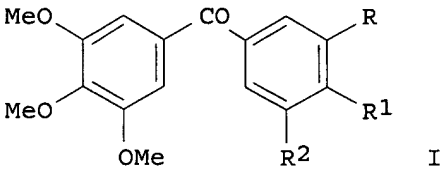

I

AB Phenstatin I (R = H, R1 = OMe, R2 = OH) and related prodrugs I [R = H, OMe, Me, Cl, F; R1 = H, OMe; R2 = OPO3Na2, OPO3H2, OAc, OMe, Me, Cl, F; R1R2 = OCH2O] were prepd. and formulated for use as antineoplastic agents. Thus, phenstatin was converted to the sodium phosphate prodrug I (R = H, R1 = OMe, R2 = OPO3Na2) by a dibenzylphosphite phosphorylation and subsequent hydrogenolysis sequence. Phenstatin was found to be a potent inhibitor of tubulin polymn. and the binding of colchicine to tubulin comparable to combretastatin A-4.

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ALL CITATIONS AVAILABLE IN THE RE FORMAT

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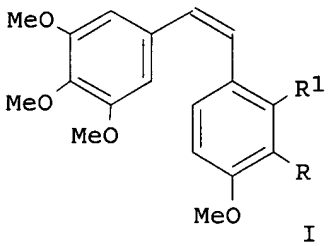
REFERENCE 2

AN 128:230173 CA
TI Antineoplastic Agents. 379. Synthesis of Phenstatin Phosphate
AU Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; Hamel, Ernest; Pettit, Robin K.
CS Cancer Research Institute and Department of Chemistry, Arizona State University, Tempe, AZ, 85287-1604, USA
SO Journal of Medicinal Chemistry (1998), 41(10), 1688-1695
CODEN: JMCMAR; ISSN: 0022-2623
PB American Chemical Society
DT Journal
LA English
GI



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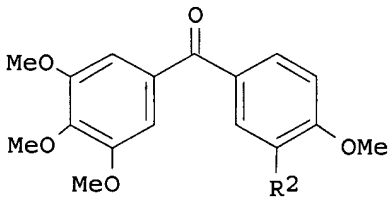

II

AB A structure-activity relationship (SAR) study of the South African willow tree (Combretum caffrum) antineoplastic constituent combretastatin A-4 (I; R = OH, R1 = H) directed at maintaining the (Z)-stilbene relationship of the olefin di-Ph substituents led to synthesis of a potent cancer cell growth inhibitor designated phenstatin (II; R2 = OH). Initially phenstatin silyl ether (II; R2 = OSiMe2CMe3) was unexpectedly obtained by Jacobsen oxidn. of combretastatin A-4 silyl ether (I; R = OSiMe2CMe2, R1 = H), and the parent phenstatin (II; R2 = OH) was later synthesized in quantity. Phenstatin was converted to the sodium phosphate prodrug [II; R2 = OP(O)(ONa)2] by a dibenzyl phosphite phosphorylation and subsequent hydrogenolysis sequence. Phenstatin (II; R2 = OH) inhibited growth of the pathogenic bacterium Neisseria gonorrhoeae and was a potent inhibitor of tubulin polymn. and the binding of colchicine to tubulin comparable to combretastatin A-4 (I; R = OH, R1 = H). Interestingly, the prodrugs were found to have reduced activity in these biochem. assays. While no significant tubulin activity was obsd. with the phosphorylated deriv. of combretastatin A-4 (I; R = OH, R1 = H), phosphate II [R2 = OP(O)(ONa)2] retained detectable inhibitory effects in both assays.
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ALL CITATIONS AVAILABLE IN THE RE FORMAT

=>

CAS ONLINE PRINTOUT

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=> d his

     (FILE 'HOME' ENTERED AT 09:46:22 ON 29 DEC 2003)

     FILE 'REGISTRY' ENTERED AT 09:46:41 ON 29 DEC 2003
L1             STRUCTURE UPLOADED
L2           0 S L1
L3           3 S L1 FUL

     FILE 'BEILSTEIN' ENTERED AT 09:48:48 ON 29 DEC 2003

=> s l1 ful
FULL SEARCH INITIATED 09:48:55 FILE 'BEILSTEIN'
FULL SCREEN SEARCH COMPLETED -     88 TO ITERATE

100.0% PROCESSED      88 ITERATIONS                                3 ANSWERS
SEARCH TIME: 00.00.07

L4           3 SEA SSS FUL L1

=> d all 1-3


L4   ANSWER 1 OF 3 BEILSTEIN COPYRIGHT 2003 BEILSTEIN MDL on STN

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                                     trimethoxybenzophenone
     Autonom Name (AUN):             (3,5-dichloro-phenyl)-(3,4,5-trimethoxy-
                                     phenyl)-methanone
     Molec. Formula (MF):            C16 H14 Cl2 O4
     Molecular Weight (MW):          341.19
     Lawson Number (LN):             9845, 289
     Compound Type (CTYPE):          isocyclic
     Constitution ID (CONSID):       6764920
     Tautomer ID (TAUTID):           7491137
     Beilstein Citation (BSO):       6-08
     Entry Date (DED):               1998/11/09
     Update Date (DUPD):             1998/11/09
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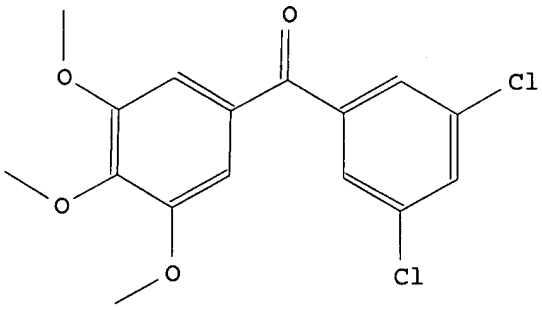


Field Availability:

Code	Name	Occurrence

CAS ONLINE PRINTOUT

BRN	Beilstein Records	1
CN	Chemical Name	1
AUN	Autonomname	1
MF	Molecular Formula	1
FW	Formular Weight	1
LN	Lawson Number	2
CTYPE	Compound Type	1
CONSID	Constitution ID	1
TAUTID	Tautomer ID	1
BSO	Beilstein Citation	1
ED	Entry Date	1
UPD	Update Date	1
MP	Melting Point	1
MS	Mass Spectrum	1
PHARM	Pharmacological Data	1

This substance also occurs in Reaction Documents:

Code	Name	Occurrence
RX	Reaction Documents	1
RXPRO	Substance is Reaction Product	1

Melting Point:

Value (MP) (Cel)	Solvent (.SOL)	Ref.
131 - 132	hexane	1

Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Mass Spectrum:
MS

Description (.KW): spectrum, electron impact (EI)

Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Pharmacological Data:
PHARM

Note(s) (.COM): cytotoxic activity: inhibition of human tumor in the NCI 60 cell line; inhibition of bovine brain tubulin polymerization (IC50: 36 .my.M) and inhibition of colchicine binding to tubulin

Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Reaction:
RX

Reaction ID (.ID): 4871104

Reactant BRN (.RBRN): 2101952, 7923766

CAS ONLINE PRINTOUT

Reactant (.RCT):	5-bromo-1,2,3-trimethoxy-benzene, N-(3,5-dichlorobenzoyl)morpholine
Product BRN (.PBRN):	7937183
Product (.PRO):	3,5-dichloro-3',4',5'-trimethoxybenzophenone
No. of React. Details (.NVAR):	1

Reaction Details:
RX

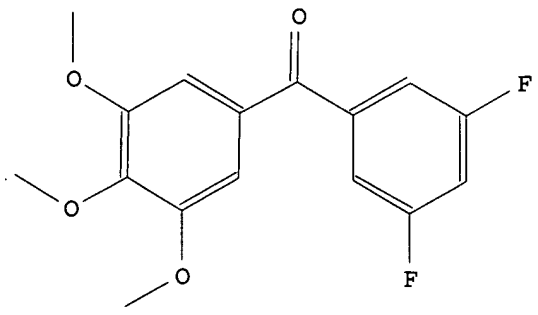
Reaction RID (.RID):	4871104.1
Reaction Classification (.CL):	Preparation
Reagent (.RGT):	1.) t-BuLi
Other Conditions (.COND):	1.) THF, -78 deg C, 15 min, 2.) THF, from -78 to -65 deg C, 4 h
Note(s) (.COM):	Yield given. Multistep reaction

Reference(s):

1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

L4 ANSWER 2 OF 3 BEILSTEIN COPYRIGHT 2003 BEILSTEIN MDL on STN

Beilstein Records (BRN):	7937124
Chemical Name (CN):	3,5-difluoro-3',4',5'-trimethoxybenzophenone
Autonom Name (AUN):	(3,5-difluoro-phenyl)-(3,4,5-trimethoxy-phenyl)-methanone
Molec. Formula (MF):	C16 H14 F2 O4
Molecular Weight (MW):	308.28
Lawson Number (LN):	9845, 289
Compound Type (CTYPE):	isocyclic
Constitution ID (CONSID):	6766869
Tautomer ID (TAUTID):	7492159
Beilstein Citation (BSO):	6-08
Entry Date (DED):	1998/11/09
Update Date (DUPD):	1998/11/09



Field Availability:

Code	Name	Occurrence
BRN	Beilstein Records	1
CN	Chemical Name	1

CAS ONLINE PRINTOUT

AUN	Autonomname	1
MF	Molecular Formula	1
FW	Formular Weight	1
LN	Lawson Number	2
CTYPE	Compound Type	1
CONSID	Constitution ID	1
TAUTID	Tautomer ID	1
BSO	Beilstein Citation	1
ED	Entry Date	1
UPD	Update Date	1
MP	Melting Point	1
MS	Mass Spectrum	1
PHARM	Pharmacological Data	1

This substance also occurs in Reaction Documents:

Code	Name	Occurrence
RX	Reaction Documents	1
RXPRO	Substance is Reaction Product	1

Melting Point:

Value (MP) (Cel)	Solvent (.SOL)	Ref.
121 - 123	hexane	1

Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Mass Spectrum:
MS

Description (.KW): spectrum, electron impact (EI)

Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Pharmacological Data:
PHARM

Note(s) (.COM): cytotoxic activity: inhibition of human tumor in the NCI 60 cell line; inhibition of bovine brain tubulin polymerization (IC50: 39 .my.M) and no inhibition of colchicine binding to tubulin

Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Reaction:
RX

Reaction ID (.ID): 4871103
Reactant BRN (.RBRN): 2101952, 7923691
Reactant (.RCT): 5-bromo-1,2,3-trimethoxy-benzene, N-(3,5-difluorobenzoyl)morpholine

CAS ONLINE PRINTOUT

Product BRN (.PBRN):	7937124
Product (.PRO):	3,5-difluoro-3',4',5'-trimethoxybenzophenone
No. of React. Details (.NVAR):	1

Reaction Details:
RX

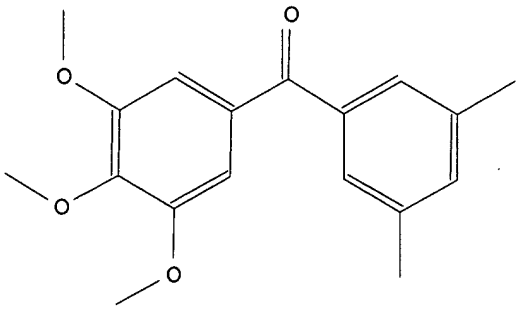
Reaction RID (.RID):	4871103.1
Reaction Classification (.CL):	Preparation
Reagent (.RGT):	1.) t-BuLi
Other Conditions (.COND):	1.) THF, -78 deg C, 15 min, 2.) THF, from -78 to -65 deg C, 4 h
Note(s) (.COM):	Yield given. Multistep reaction

Reference(s):

1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

L4 ANSWER 3 OF 3 BEILSTEIN COPYRIGHT 2003 BEILSTEIN MDL on STN

Beilstein Records (BRN):	7933924
Chemical Name (CN):	3,4,5-trimethoxy-3',5'-dimethylbenzophenone
Autonom Name (AUN):	(3,5-dimethyl-phenyl)-(3,4,5-trimethoxy-phenyl)-methanone
Molec. Formula (MF):	C18 H20 O4
Molecular Weight (MW):	300.35
Lawson Number (LN):	9855, 289
Compound Type (CTYPE):	isocyclic
Constitution ID (CONSID):	6763033
Tautomer ID (TAUTID):	7490248
Beilstein Citation (BSO):	6-08
Entry Date (DED):	1998/11/09
Update Date (DUPD):	1998/11/09



Field Availability:

Code	Name	Occurrence
BRN	Beilstein Records	1
CN	Chemical Name	1
AUN	Autonomname	1
MF	Molecular Formula	1

CAS ONLINE PRINTOUT

FW	Formular Weight	1
LN	Lawson Number	2
CTYPE	Compound Type	1
CONSID	Constitution ID	1
TAUTID	Tautomer ID	1
BSO	Beilstein Citation	1
ED	Entry Date	1
UPD	Update Date	1
MP	Melting Point	1
MS	Mass Spectrum	1
PHARM	Pharmacological Data	1

This substance also occurs in Reaction Documents:

Code	Name	Occurrence
RX	Reaction Documents	1
RXPRO	Substance is Reaction Product	1

Melting Point:

Value (MP) (Cel)	Solvent (.SOL)	Ref.
104 - 105	hexane	1

Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Mass Spectrum:
MS
Description (.KW): spectrum, electron impact (EI)
Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Pharmacological Data:
PHARM
Note(s) (.COM): cytotoxic activity: inhibition of human tumor in the NCI 60 cell line; inhibition of bovine brain tubulin polymerization (IC50: 11 .my.M) and inhibition of colchicine binding to tubulin
Reference(s):
1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

Reaction:
RX
Reaction ID (.ID): 4871102
Reactant BRN (.RBRN): 2101952, 7921069
Reactant (.RCT): 5-bromo-1,2,3-trimethoxy-benzene, N-(3,5-dimethylbenzoyl)morpholine
Product BRN (.PBRN): 7933924
Product (.PRO): 3,4,5-trimethoxy-3',5'-

CAS ONLINE PRINTOUT

dimethylbenzophenone

No. of React. Details (.NVAR): 1

Reaction Details:

RX

Reaction RID (.RID): 4871102.1

Reaction Classification (.CL): Preparation

Reagent (.RGT): 1.) t-BuLi

Other Conditions (.COND): 1.) THF, -78 deg C, 15 min, 2.) THF, from -78 to -65 deg C, 4 h

Note(s) (.COM): Yield given. Multistep reaction

Reference(s):

1. Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; et al., J.Med.Chem., CODEN: JMCMAR, 41(10), <1998>, 1688-1695; BABS-6093785

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CAS ONLINE PRINTOUT

=> d his

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L3 3 S L1 FUL

FILE 'BEILSTEIN' ENTERED AT 09:48:48 ON 29 DEC 2003
L4 3 S L1 FUL

FILE 'CAPLUS' ENTERED AT 09:54:25 ON 29 DEC 2003
L5 STRUCTURE UPLOADED
S L5

FILE 'REGISTRY' ENTERED AT 09:54:45 ON 29 DEC 2003
L6 3 S L5 CSS FUL

FILE 'CAPLUS' ENTERED AT 09:54:46 ON 29 DEC 2003
L7 13 S L6 CSS FUL

FILE 'REGISTRY' ENTERED AT 09:55:39 ON 29 DEC 2003

FILE 'CAPLUS' ENTERED AT 09:55:52 ON 29 DEC 2003

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FILE 'CAPLUS' ENTERED AT 09:56:28 ON 29 DEC 2003

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L5 HAS NO ANSWERS
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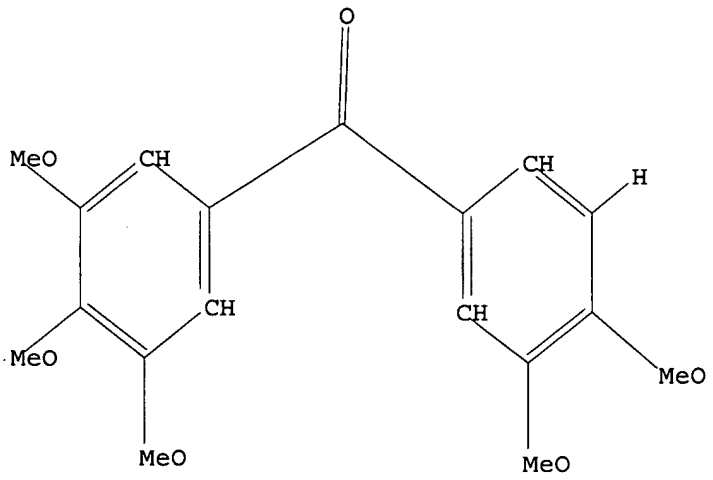

G1 Me,Et,n-Pr,i-Pr,P
G2 Cl,F,Me

Structure attributes must be viewed using STN Express query preparation.

=> d bib abs hitstr 1-13

CAS ONLINE PRINTOUT

L7 ANSWER 1 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1999:451177 CAPLUS
DN 131:73506
TI Synthesis and formulation of phenstatin and related prodrugs for use as antitumor agents
IN Pettit, George R.; Toki, Brian
PA Arizona State University, USA
SO PCT Int. Appl., 39 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9934788	A1	19990715	WO 1999-US475	19990109
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	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2314510	AA	19990715	CA 1999-2314510	19990109
	EP 1045689	A1	20001025	EP 1999-902133	19990109
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, FI				
	JP 2002500184	T2	20020108	JP 2000-527239	19990109
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OS MARPAT 131:73506
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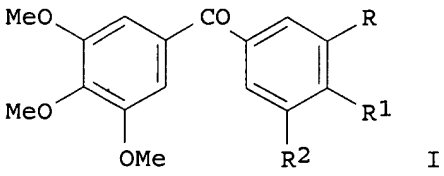
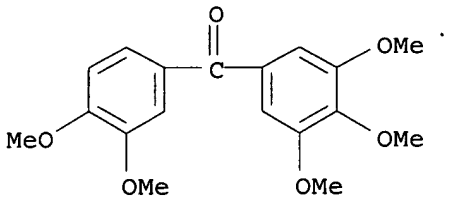


I

AB Phenstatin I (R = H, R1 = OMe, R2 = OH) and related prodrugs I [R = H, OMe, Me, Cl, F; R1 = H, OMe; R2 = OPO3Na2, OPO3H2, OAc, OMe, Me, Cl, F; R1R2 = OCH2O] were prepd. and formulated for use as antineoplastic agents. Thus, phenstatin was converted to the sodium phosphate prodrug I (R = H, R1 = OMe, R2 = OPO3Na2) by a dibenzylphosphite phosphorylation and subsequent hydrogenolysis sequence. Phenstatin was found to be a potent inhibitor of tubulin polymn. and the binding of colchicine to tubulin comparable to combretastatin A-4.

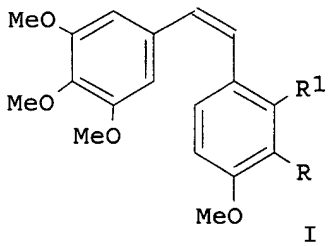
IT **22699-97-4P**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(synthesis and formulation of phenstatin and related prodrugs for use as antitumor agents)
RN 22699-97-4 CAPLUS
CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)

CAS ONLINE PRINTOUT

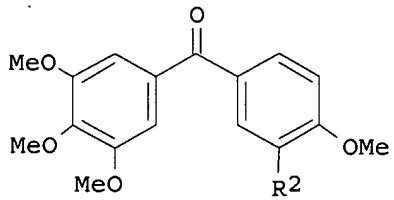


RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L7 ANSWER 2 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1998:253141 CAPLUS
DN 128:230173
TI Antineoplastic Agents. 379. Synthesis of Phenstatin Phosphate
AU Pettit, George R.; Toki, Brian; Herald, Delbert L.; Verdier-Pinard, Pascal; Boyd, Michael R.; Hamel, Ernest; Pettit, Robin K.
CS Cancer Research Institute and Department of Chemistry, Arizona State University, Tempe, AZ, 85287-1604, USA
SO Journal of Medicinal Chemistry (1998), 41(10), 1688-1695
CODEN: JMCMAR; ISSN: 0022-2623
PB American Chemical Society
DT Journal
LA English
GI



I



II

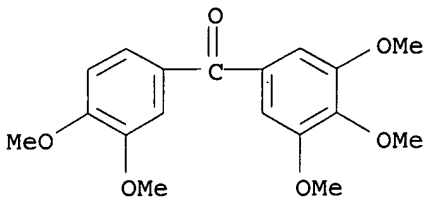
AB A structure-activity relationship (SAR) study of the South African willow tree (Combretum caffrum) antineoplastic constituent combretastatin A-4 (I; R = OH, R1 = H) directed at maintaining the (Z)-stilbene relationship of the olefin di-Ph substituents led to synthesis of a potent cancer cell growth inhibitor designated phenstatin (II; R2 = OH). Initially phenstatin silyl ether (II; R2 = OSiMe2CMe3) was unexpectedly obtained by Jacobsen oxidn. of combretastatin A-4 silyl ether (I; R = OSiMe2CMe2, R1 = H), and the parent phenstatin (II; R2 = OH) was later synthesized in quantity. Phenstatin was converted to the sodium phosphate prodrug [II; R2 = OP(O)(ONa)2] by a dibenzyl phosphite phosphorylation and subsequent hydrogenolysis sequence. Phenstatin (II; R2 = OH) inhibited growth of the pathogenic bacterium Neisseria gonorrhoeae and was a potent inhibitor of tubulin polymn. and the binding of colchicine to tubulin comparable to combretastatin A-4 (I; R = OH, R1 = H). Interestingly, the prodrugs were found to have reduced activity in these biochem. assays. While no significant tubulin activity was obsd. with the phosphorylated deriv. of combretastatin A-4 (I; R = OH, R1 = H), phosphate II [R2 = OP(O)(ONa)2] retained detectable inhibitory effects in both assays.

IT **22699-97-4P**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation)

(structure-activity relationship of the antineoplastic agent combretastatin A-4)

RN 22699-97-4 CAPLUS

CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)



RE.CNT 53 THERE ARE 53 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L7 ANSWER 3 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN

AN 1997:594340 CAPLUS

DN 127:287685

TI Specificity in structure-based drug design: identification of a novel, selective inhibitor of Pneumocystis carinii dihydrofolate reductase

AU Gschwend, Daniel A.; Sirawaraporn, Worachart; Santi, Daniel V.; Kuntz, Irwin D.

CS Department of Pharmaceutical Chemistry and of Biochemistry and Biophysics, University of California, San Francisco, CA, 94143-0446, USA

SO Proteins: Structure, Function, and Genetics (1997), 29(1), 59-67
CODEN: PSFGEY; ISSN: 0887-3585

PB Wiley-Liss

DT Journal

LA English

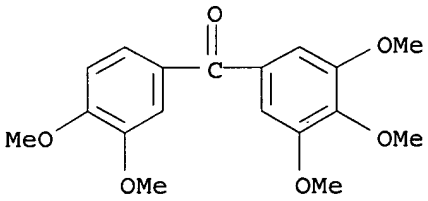
AB Specificity is an important aspect of structure-based drug design. Distinguishing between related targets in different organisms is often the key to therapeutic success. Pneumocystis carinii is a fungal opportunist which causes a crippling pneumonia in immunocompromised individuals. We report the identification of novel inhibitors of P. carinii dihydrofolate reductase (DHFR) that are selective vs. inhibition of human DHFR using computational mol. docking techniques. The Fine Chems. Directory, a data-base of com. available compds., was screened with the DOCK program suite to produce a list of potential P. carinii DHFR inhibitors. We then used a postdocking refinement directed at discerning subtle structural and chem. features that might reflect species specificity. Of 40 compds. predicted to exhibit anti-Pneumocystis DHFR activity, each of novel chem. framework, 13 (33%) show IC50 values better than 150 .mu.M in an enzyme assay. These inhibitors were further assayed against human DHFR: 10 of the 13 (77%) bind preferentially to the fungal enzyme. The most potent compd. identified is a 7 .mu.M inhibitor of P. carinii DHFR with 25-fold selectivity. The ability of mol. docking methods to locate selective inhibitors reinforces our view of structure-based drug discovery as a valuable strategy, not only for identifying lead compds., but also for addressing receptor specificity.

IT **22699-97-4**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(structure-based drug design of pneumocystis carinii dihydrofolate reductase inhibitors)

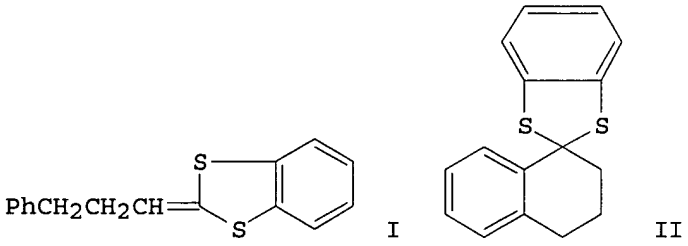
RN 22699-97-4 CAPLUS

CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)

CAS ONLINE PRINTOUT



L7 ANSWER 4 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1991:6336 CAPLUS
DN 114:6336
TI 1,3-Benzodithiolium cation mediated cyclization reactions
AU Rigby, James H.; Kotnis, Atul; Kramer, James
CS Dep. Chem., Wayne State Univ., Detroit, MI, 48202, USA
SO Journal of Organic Chemistry (1990), 55(17), 5078-88
CODEN: JOCEAH; ISSN: 0022-3263
DT Journal
LA English
OS CASREACT 114:6336
GI



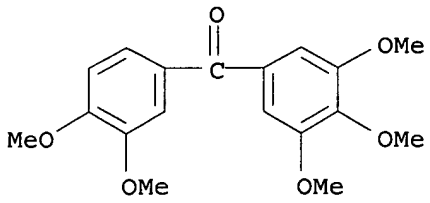
I II

AB General protocols for the construction of various ring systems employing cation olefin cyclizations initiated by the readily accessible 1,3-benzodithiolium ion are described. Several substituted tetralones and tetralins can be rapidly assembled by this methodol. as can a variety of substituted bicyclo[3.2.1]octane and tricyclic ring systems. The products of these transformations are amenable to interconversion into a range of functionalized species. Thus, PhCH2CH2CHO was condensed with 2-(diethoxyphosphinyl)-1,3-benzodithiole to give the adduct I, which was cyclized p-MeC6H4SO3H to give tetralin deriv. II.

IT **22699-97-4P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. and condensation of, with tri-Et phosphonoacetate)

RN 22699-97-4 CAPLUS
CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)

CAS ONLINE PRINTOUT



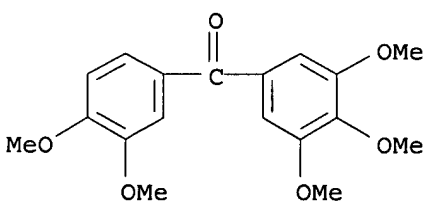
L7 ANSWER 5 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1990:218894 CAPLUS
DN 112:218894
TI Powdered epoxy resin compositions for anticorrosive coatings
IN Bymark, Richard M.; Kirk, Alan R.; Griggs, Allen L.; Martin, Steven J.
PA Minnesota Mining and Mfg. Co., USA
SO Eur. Pat. Appl., 11 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 342035	A2	19891115	EP 1989-304781	19890511
	EP 342035	A3	19911009		
	R: DE, FR, GB, IT				
	AU 8934626	A1	19891116	AU 1989-34626	19890509
	AU 615744	B2	19911010		
	NO 8901920	A	19891113	NO 1989-1920	19890511
	JP 02018467	A2	19900122	JP 1989-120215	19890512
PRAI	US 1988-193498		19880512		

AB The compns. contain uncured epoxy resins with epoxy equiv. wt. (EEW) .gtoreq.99 and compds. contg. pyrocatechol (derivs.), 1,8-dihydroxynaphthalene (derivs.), and HOQOH (Q = arom. or heterocyclic moieties having OH on adjacent carbon atoms or on available adjacent positions). Coating a compn. of Shell 2004 (epoxy resin, EEW 875-975) 200, Ca metasilicate 70, TiO2 10, acrylic polymer-coated SiO2 (flow control agent) 2, dicyandiamide 3.75, 2-methylimidazole 1,2,4,6-tris(dimethylaminomethyl)phenol 3, and 3,3',4,4',5-pentahydroxybenzophenone 4 parts on a steel bar and air-drying at room temp. gave a bar showing good adhesion (75.degree., H2O, 2 wk or cathodic debonding test).

IT **22699-97-4P**
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(prepn. and hydrolysis of, for powd. epoxy coatings)

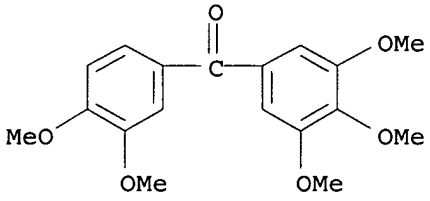
RN 22699-97-4 CAPLUS
CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)



L7 ANSWER 6 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN

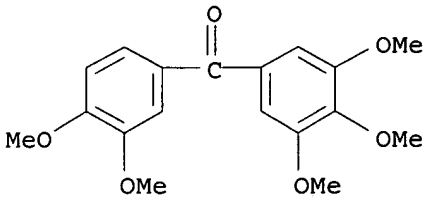
CAS ONLINE PRINTOUT

AN 1974:412654 CAPLUS
DN 81:12654
TI Mass spectra of substituted 2-methylbenzophenones
AU Grimshaw, James; Sell, Charles S.; Haslett, Reginald J.
CS Dep. Chem., Queen's Univ., Belfast, UK
SO Organic Mass Spectrometry (1974), 8, 381-6
CODEN: ORMSBG; ISSN: 0030-493X
DT Journal
LA English
AB The mass spectra of MeO and Me derivs. of 2-MeC6H4COPh were detd. Substituent loss from 3'- and 4' -positions as well as from the 2' -positions were important fragmentation processes. Thus the fragmentations were of little use in locating substituents. D labeling showed that the [M-1]+ ion from 3',4,4',5,5' -pentamethoxy-2-methylbenzophenone arose largely by H loss from 2'-and 6'-positions.
IT **22699-97-4P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)
RN 22699-97-4 CAPLUS
CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)



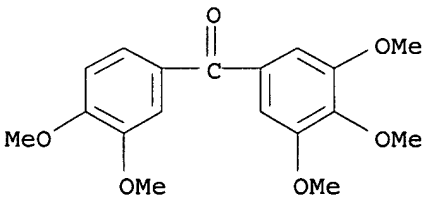
L7 ANSWER 7 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1969:461046 CAPLUS
DN 71:61046
TI Polycyclic compounds. I. Novel method for the synthesis of substituted fluorenones
AU Pol, V. A.; Wagh, S. M.; Barve, V. P.; Kulkarni, A. B.
CS Univ. Bombay, Bombay, India
SO Indian Journal of Chemistry (1969), 7(6), 557-60
CODEN: IJOCAP; ISSN: 0019-5103
DT Journal
LA English
AB Substituted fluorenones were prepd. from o-bromo-substituted benzophenones using NaH or NaOEt for cyclization. 2'-Bromo-4,5-dimethoxy-benzophenone on cyclization affords 2,3-dimethoxy- and 3,4-dimethoxyfluorenone. Similarly, 6'-bromo-3,3',4,4',5'-penta-methoxybenzophenone on cyclization affords 2,3,4,6,7-pentamethoxy- and 2,3,4,5,6-pentamethoxyfluorenone. The structures of the isomeric pentamethoxyfluorenones were detd. by N.M.R. spectroscopy.
IT **27133-79-5P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)
RN 27133-79-5 CAPLUS
CN Benzophenone, bromo-3,3',4,4',5-pentamethoxy- (8CI) (CA INDEX NAME)

CAS ONLINE PRINTOUT



D1— Br

L7 ANSWER 8 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1969:81543 CAPLUS
DN 70:81543
TI Spectroscopic studies of some aryl ketone-tetracyanoethylene complexes
AU Foster, J.; Goldstein, Michael
CS Northern Polytech., London, UK
SO Spectrochimica Acta, Part A: Molecular and Biomolecular Spectroscopy (1969), 25(1), 141-50
CODEN: SAMCAS; ISSN: 1386-1425
DT Journal
LA English
AB Equil. consts. of formation were detd. for some aryl ketone-tetracyanoethylene complexes by measurements on their charge-transfer absorption bands in CCl4 and (or) CH2Cl2 solns. at 33.degree. and other temps. Evidence is presented which indicates that the stoichiometry of the complexes formed is 1:1 and that the .pi.-aromatic electron clouds rather than the carbonyl O atoms of the ketones, function as the donor sites. Some enthalpies of formation were evaluated, and some .pi.-electron ionization energies estd. The results of Hueckel mol. orbital calcns. are presented.
IT **22699-97-4**
RL: PRP (Properties)
(mol. orbitals of, charge-transfer complex formation with tetracyanoethylene in relation to)
RN 22699-97-4 CAPLUS
CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)



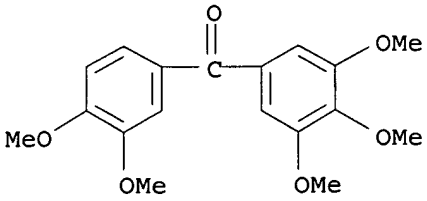
IT **22699-76-9P**
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of)
RN 22699-76-9 CAPLUS
CN Ethenetetracarbonitrile, compd. with 3,3',4,4',5-pentamethoxybenzophenone (1:1) (8CI) (CA INDEX NAME)

CM 1

CRN 22699-97-4

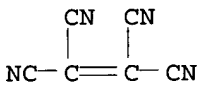
CAS ONLINE PRINTOUT

CMF C18 H20 O6



CM 2

CRN 670-54-2
CMF C6 N4



L7 ANSWER 9 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1963:461993 CAPLUS
DN 59:61993
OREF 59:11368a-h,11369a-h,11370a-h,11371a-h,11372a-h,11373a-h,11374a-h,11375a-b
TI Natural products inhibiting mitoses. XI. Structure of sikkimotoxin. 1. Synthesis of stereoisomeric 6,7-dimethoxy analogs of podophyllotoxin
AU Schreier, E.
CS Sandoz Ltd., Basel, Switz.
SO Helvetica Chimica Acta (1963), 46, 75-117
CODEN: HCACAV; ISSN: 0018-019X
DT Journal
LA German
OS CASREACT 59:61993
GI For diagram(s), see printed CA Issue.
AB cf. CA 53, 21827a; 55, 23786b. (Throughout this abstr. Z = 3,4,5(MeO)3C6H2; in the formulas, the black points indicate that the H atoms on the C-atoms indicated are situated in front of the plane of the paper.) The total synthesis of several stereoisomeric 6,7-(MeO)2 analogs of podophyllotoxin (I), the main components of the resin of Podophyllum emodi and P. peltatum, was described. One of the synthetic lactones, for which the name picrosikkimotoxin (II) was proposed, corresponded in its configuration to picropodophyllin (III), the compd. produced from I by base-catalyzed epimerization. The structure corresponding to synthetic II has been assigned by Chatterjee, et al., to what they called isosikkimotoxin (IV), the product of the base-catalyzed epimerization of sikkimotoxin (V), a new lignan lactone isolated from the rhizomes of P. sikkimensis (Chatterjee and Datta, CA 45, 7567a) and thought to be analogous to I. The properties of the synthetic optically active II, whose structure and abs. configuration were established unequivocally by stereochem. correlation with III, and its Ac deriv. did not agree in all respects with IV and its Ac deriv. This fact gave rise to some doubt as to the correctness of the proposed structure or the purity of the compds. from natural source. A direct comparison of the synthetic and natural compds. was not possible because of the unavailability of authentic material. Gallic acid hydrate (250 g.) dissolved in 2.5 l. H2O contg. 400 g. NaOH with stirring and ice cooling in a N atom, the soln. treated dropwise with 670 ml. Me2SO4 in such a manner that the temp. did not

exceed 5.degree., stirred overnight at room temp., boiled 2 hrs., treated with 100 g. NaOH in 150 ml. H2O, boiled 2 hrs., treated with 10 g. C, filtered hot, the filtrate acidified to Congo red (Congo) with 500 ml. 18% HCl, and cooled gave 240-50 g. crude ZCO2H (VI); distn. of crude VI gave 240 g. VI (av. of 10 expts.), b12 215-20.degree., m. 166-8.degree.. VI (240 g.) heated to boiling with 250 ml. SOCl2, when all solid dissolved the soln. refluxed 1 hr., and fractionated gave 230 g. ZCOCl (VII) (av. of 4 expts.), b12 168-70.degree., m. 75-6.degree.. To an ice-cold soln. of 138 g. veratrole in 1 l. (Cl2CH)2 (VIII) was added 120 ml. SnCl4 followed dropwise by 230 g. VII in 400 ml. VIII, the mixt. stirred 6 hrs. at room temp., decompd. with 250 ml. 18% HCl, steam distd., the residue from the steam distn. extd. with C6H6, the ext. washed with dil. aq. NaOH, dried, evapd. in vacuo, and the residue crystd. from Me2CO-MeOH to give 290 g. 3,4-(MeO)2C6H3COZ (IX) (av. of 4 expts.), m. 122-3.degree., .lambda. (EtOH) 312 m.mu. (log .epsilon. 4.15), .nu. (Nujol) 1638 cm.-1 and .nu.(CH2Cl2) 1650 cm.- Similar condensation of 1 mole veratrole and 1 mole VII with 1 mole AlCl3 gave 258 g. IX. K (60 g.) dissolved in 650 ml. tert-BuOH by refluxing (oil bath 120.degree.; duration 3 hrs.) and stirring in a N atm., the soln. treated with 332 g. IX and 260 g. (EtO2CCH2)2 in 800 ml. tert-BuOH, refluxed and stirred 2 hrs., neutralized with 500 ml. 2N HCl with stirring and ice cooling, the tert-BuOH removed in vacuo, the resulting aq. phase made acid to Congo with 18% HCl, extd. with 4 500-ml. portions Et2O, the combined Et2O solns. extd. with 4 500-ml. portions 2N NaOH, the combined exts. refluxed overnight, cooled, mixed with 3 l. CHCl3 and 1 kg. ice, made acid to Congo by dropwise addn. of 500 ml. concd. HCl, the org. phase sepd., washed twice with 600 ml. H2O, dried, evapd. in vacuo, and the residue crystd. from EtOAc gave 330 g. mixt. (X) of XI and XII, m. 176-80.degree.; from the mother liquor was isolated 32 g. X, m. 177-80.degree., and 13 g., m. 174-6.degree.. X (from a 1 mole run) by tedious fractional crystn. from Me2CO-MeOH was sepd. into its components; XII crystd. from MeOH-Me2CO gave 92 g. XII, m. 193-4.degree., .lambda. (MeOH) 286 m.mu. (log .epsilon. 4.10), .nu. (Nujol) 1712 and 1684 cm.-1 and .nu. (KBr) 1710 and 1680 cm.-1; the product from the mother liquors crystd. from MeOH and then recrystd. from EtOAc, EtOH, and Me2CO gave 20 g. XI, m. 196-8.degree., mixed m.p. with XII depressed, .nu. (Nujol) 1712 and 1682 cm.-1, its a ultraviolet spectrum (UV) being the same as that of XII; crystn. of the product from the combined mother liquors from EtOAc gave 250 g. X, m. 176-8.degree.. X (150 g.) in 1.5 l. EtOH hydrogenated over 7.5 g. 10% Pd-C at room temp. and atm. pressure, after absorption of 8.7 l. H the mixt. filtered, and the filtrate evapd. in vacuo gave a mixt. (XIII) of XIV and XV, colorless glass, .lambda. (MeOH) 278.5 m.mu. (log .epsilon. 3.62); XIII dissolved in a little MeOH and the soln. dild. with 1 l. Et2O gave 90 g. cryst. XIII, m. 165-7.degree., and 47 g. cryst. XIII, m. 155-8.degree.. By tedious fractional crystn. was isolated XIV, m. 179-80.degree. (Me2CO-Et2O), .lambda. (MeOH) 278 m.mu. (log .epsilon. 3.63), .nu. (Nujol) 1728 and 1702 cm.-1 and .nu. (CH2Cl2) 1715 cm.-1, and XV, m. 168-9.degree. (MeOH Et2O), .lambda. (MeOH) 278 m.mu. (log .epsilon. 3.63), .nu. (Nujol) 1732 and 1698 cm.-1 and .nu. (CH2Cl2) 1715 cm.-1 Hydrogenation of 10 g. XI in 120 ml. EtOH with 10% Pd-C at room temp. and atm. pressure gave (after absorption of 550 ml. H) 9.5 g. XIV, m. 179-81.degree. (Et2O). Similar hydrogenation of 90 g. XII in 1 l. EtOH over 5 g. 10% Pd-C gave (after absorption of 5.1 l. H) 86 g. XV, m. 168-9.degree. (Et2O, then MeOH-Et2O). XIII (100 g.) and 200 ml. AcCl boiled and stirred 2 hrs., evapd. in vacuo, the residue dissolved in C6H6, the soln. washed with cold aq. NaHCO3 and ice H2O, dried, and evapd. gave a mixt. (XVI) of the anhydrides of XIV and XV; anal. XVI had .nu. (CH2Cl2) 1860 and 1780 cm.-1, b0.005 220-30.degree.. SnCl4 (60 ml.) in 100 ml. PhNO2 added dropwise to 0.23 mole XVI in 300 ml. PhNO2 with stirring and ice cooling, the mixt. stirred overnight (while allowing the ice in the ice bath to melt) treated with 400 ml. dil. HCl, extd. with 500 ml. Et2O, the org. phase washed once with dil. HCl and twice with H2O, extd. exhaustively with dil. aq. NaOH, the combined alk.

exts. made acid to Congo, extd. with CHCl3, the ext. washed, dried, evapd., and the residue crystd. from MeOH gave first (the less-sol.) 40 g. XVII, m. 242-3.degree. (EtOH), .lambda. (MeOH) 210, 235, 277,315 m.mu. (log .epsilon. 4.66, 4.47, 4.08, 3.88), .nu. (Nujol) 1732 cm.-1 [semicarbazone m. 256-8.degree. (decompn.) (EtOH)]; the mother liquor of XVII evapd. in vacuo and the residue crystd. from EtOAc gave 28 g. XVIII, m. 173-4.degree. (EtOAc), .lambda. (MeOH) 232.5 and 279 m.mu. (log .epsilon. 4.48 and 4.26) .nu. (Nujol) 1680 and 1740 cm.-1; from the mother liquor of XVIII was isolated a slight amt. XIX, m. 204-5.degree. (MeOH, then EtOH, then EtOAc), .nu. (CHCl3) 1715 and 1670 cm.-1 and .nu. (Nujol) 1738 and 1648 cm.-1, its UV being like that of XVII. XVIII (10 g.) in 150 ml. MeOH contg. 10 ml. concd. H2SO4 refluxed and stirred 6 hrs. and cooled gave 9.3 g. Me ester (XX) of XVIII, m. 158-9.degree., its UV being like that of XVIII, .nu. (CH2Cl2) 1740 and 1684 cm.-1 XX (1 g.) refluxed and stirred 3 hrs. with 20 ml. N NaOH, cooled, made acid to Congo with dil. aq. HCl, and the product isolated with EtOAc gave 870 mg. XVIII, m. 171-2.degree. (EtOAc). Esterification of XVIII with EtOH and concd. H2SO4 gave 90% Et ester of XVIII, m. 137-8.degree. (EtOH), its UV being like that of XVIII, .nu. (CH2Cl2) 1728 and 1678 cm.-1 XIX Me ester (XXI) (via CH2N2) m. 149-50.degree. (MeOH), its UV being like that of XIX, .nu. (CH2Cl2) 1738 and 1670 cm.-1 XXI (100 mg.) and 5 ml. 2N NaOH refluxed and stirred 3 hrs., acidified to Congo with dil. aq. HCl, and the product isolated with EtOAc gave 80 mg. XVII, m. 242-3.degree.; XVII Me ester (XVIIa) (via CH2N2) m. 172-3.degree. (MeOH). Esterification of XIX with EtOH and concd. H2SO4 gave XIX Et ester, m. 173-4.degree. (EtOH), its UV like that of XIX, .nu. (CH2Cl2) 1732 and 1672 cm.-1 XVI treated 6 hrs. at 10-15.degree. with 2 equivs. AlCl3 gave a mixt. which yielded 35-45% XVII and 15-20% XVIII after fractional crystn.; from the mother liquor of XVII and XVIII was isolated a slight amt. XXII, m. 182-3.degree., .lambda. (MeOH) 230, 267, and 310 m.mu. (log .epsilon. 4.42, 3.98, and 3.84), .nu. (CH2Cl2) 1702 cm.-1 and .nu. (Nujol) 1694 cm.-1 Me ester (XXIII) (via CH2N2) m. 134-6.degree. (MeOH), .lambda. (MeOH) 232, 269, and 312.5 m.mu. (log .epsilon. 4.54, 4.12, and 4.00), .nu. (CH2Cl2) 1732 and 1700 cm.-1 Sapon. of XXIII gave XXII, m. 182-3.degree.. Pure XIV (50 g.) treated with AcCl and SnCl4 as above gave 42.4 g. XVII, m. 241-2.degree. (MeOH). The anhydride of XV (from 10 g. XV) in 50 ml. PhNO2 treated dropwise with 7 ml. SnCl4 in 50 ml. PhNO2 with stirring and ice cooling, kept overnight at room temp., dild. with 100 ml. Et2O, the org. phase extd. twice with 100 ml. dil. HCl and B times with 100 ml. 2N NaOH, the alk. ext. made acid with 18% HCl, the product (9 g.) isolated with CHCl3, and crystd. from EtOAc gave 6.7 g. XVIII, m. 173-4.degree. (EtOAc); from the mother liquor was isolated 0.57 g. XIX, m. 204-5.degree. (EtOH). Treatment of 23 millimoles anhydride of XV with 7 g. AlCl3 in 100 ml. PhNO2 as above gave 8.9 g. cyclization product, which gave 6.2 g. XVIII, after crystn. from EtOAc; the product from the mother liquors recryst. repeatedly from EtOAc gave 0.82 g. XXII, m. 182-3.degree.. XVII (25 g.) suspended in 300 ml. MeOH contg. 15 ml. concd. H2SO4 refluxed and stirred overnight and cooled gave 24 g. XVIIa, m. 171-2.degree., its UV like that of XVII, .nu. (CH2Cl2) 1734 and 1678 cm.-1 Sapon. of XIIa gave XVII, m. 242-3.degree.. XVII (50 g.), 500 ml. EtOH, and 30 ml. concd. H2SO4 refluxed and stirred overnight and cooled gave 49 g. XVII Et ester (XXIV), m. 144-5.degree., its UV like that of XVII, .nu. (CH2Cl2) 1734 and 1680 cm.-1 XXIV (20 g.) and 20 g. HCO2Et in 300 ml. C6H6 treated with 2 g. Na and stirred at room temp. under N (moisture excluded) (the Na dissolved in 10-15 hrs.), the soln. cooled in ice, extd. exhaustively with iced dil. aq. NaOH, the combined exts. made acid to Congo with 18% HCl with cooling, and the product isolated with CH6 gave 15 g. 3-hydroxymethylene deriv. (XXV) of XXIV, m. 160-1.degree. (MeOH), .lambda. (EtOH) 241, 290, and 340 m.mu. (log .epsilon. 4.37, 4.01, and 4.11), .nu. (CH2Cl2) 1732, 1645, and 1600 cm.-1 Similar formylation of XVIIa was accompanied by ester exchange and gave the same yield of XXV. Crude XXV (20 g.) in 300 ml. MeOH treated portionwise with 20 g. NaBH4 with stirring and ice cooling, the mixt.

kept 2 hrs. at 0-5.degree., stirred 1 hr. at 60.degree., treated with 300 ml. H2O, refluxed 3 hrs., the MeOH removed in vacuo, the residual aq. phase dild. with 300 ml. H2O, extd. with CHCl3, and acidified to Congo with 300 ml. dil. HCl with stirring and cooling gave 13 g. DL-isosikkimotoxic acid (XXVI), m. 232-5.degree. (decompn.) (90% EtOH), .lambda. (MeOH) 278 m.mu. (log .epsilon. 3.57), .nu. (Nujol) 3400, 3270, and 1692 cm.-1; from the CHCl3 ext. was isolated 1.1 g. neutral fraction, putative 1-(3,4,5-trimethoxyphenyl)-2,3-bis(hydroxymethyl)-4-hydroxy-6,7-dimethoxytetralin, m. 194-5.degree. (MeOH), .lambda. (EtOH) 280 m.mu. (log .epsilon. 3.55), .nu. (Nujol) 3380 cm.-1 (OH) and contained no carbonyl bands [tri-O-acetate m. 119-20.degree. (EtOH), .nu. (Nujol) 1722 cm.-1 and .nu. (CH2Cl2) 1730 cm.-1]. DL-XXVI (15 g.) in 100 ml. AcOH boiled 1 hr., the soln. treated with 20 ml. Ac2O, boiled 0.5 hr., treated with 20 g. NaOAc, boiled 0.5 hr., evapd. in vacuo, the residue partitioned between CHCl3 and aq. KHCO3, the CHCl3 layer, washed, dried, and evapd. gave 11.0 g. DL-.beta.-apopicrosikkimotoxin (XXVII), m. 226-7.degree. (EtOH, then CHCl3-EtOH, then CHCl3-EtOAc), .lambda. (EtOH) 281 m.mu. (log .epsilon. 3.62), .nu. (CHCl3) 1756 and 1694 cm.-1; from the combined mother liquors of various expts. was isolated by chromatography on silica gel and Al2O3 followed by crystn. slight amts. O-acetyl-DL-isosikkimotoxin (XXVIII), m. 240-1.degree. (CHCl3-EtOH), O-acetyl-DL-epiisosik kimotoxin (XXIX), m. 189-90.degree. (CHCl3-EtOH), and dehydroanhydrosikkimotoxin, m. 215-17.degree. (CH2Cl2-MeOH), .lambda. (EtOH) 258, 313, and 350 m.mu. (log .epsilon. 4.71, 3.96, and 3.63), .nu. (Nujol) 1744 cm.-1 and .nu. (CH2Cl2) 1758 cm.-1 DL-.beta.-XXVII could be prepd. in 41-5% yield without isolation of any cryst. intermediates starting from 0.1 mole XXIIIa or XXIV. XVII (4 g.) in 25 ml. 2N NaOH and 250 ml. H2O heated 50.degree., treated with 280 ml. 5% aq. KMnO4 in portions of 20 ml. with stirring, the pptd. MnO2 brought into soln. by means of SO2, the soln. acidified with concd. HCl, extd. with Et2O, the Et2O soln. extd. exhaustively with aq. KHCO3, dried, and fractionated gave 12 mg. unidentified compd., b0.001 200.degree., m. 200-1.degree. (MeOH); the KHCO3 ext. acidified and the product isolated with Et2O gave 870 mg. acidic fraction, which was crystd. from Et2O and then MeOH and sublimed in vacuo to give 300 mg. 4,5,2-(MeO)2(ZCO)C6H2CO2H (XXX), m. 213-14.degree., .lambda. (EtOH) 219, 254, and 291 m.mu. (log .epsilon. 4.55, 4.14, and 4.19), .nu. (Nujol) 1722, 1682, and 1645 cm.-1 [Me ester (XXXI) (via Et2O-CH2N2) b0.001 170.degree., m. 145-6.degree. (MeOH), .nu. (CH2Cl2) 1722 and 1672 cm.-1]; the residue of the mother liquors of XXX dissolved in MeOH, the soln. treated with Et2O-CH2N2, and fractionated gave 65 mg. ZCO2Me, b0.001 100.degree., m. 83-4.degree., and 160 mg. XXXI, b0.001 170-200.degree., m. 144-5.degree. (MeOH). 1-(3,4,5-Trimethoxyphenyl)-4-oxo-6,7-methylenedioxy-1,2,3,4-tetrahydro-2-naphthoic acid Me ester (Gensler, et al., CA 54, 15325f) (20 g.) in 300 ml. AcOH hydrogenated over 2 g. 10% Pd-C at room temp. and atm. pressure using a vibromixer gave 17.8 g. XXXII (R = Me), m. 157-8.degree. (MeOH), .lambda. (EtOH) 292.5 m.mu. (log .epsilon. 3.67), .nu. (Nujol or CH2Cl2) 1730 cm.-1 XXXII (R = Me) in 150 ml. N NaOH and 50 ml. EtOH refluxed and stirred 4 hrs., acidified to Congo, and the product isolated with CHCl3 gave 8.9 g. XXXII (R = H), m. 209-10.degree. (EtOH), its UV like that of XXXII (R = Me), .nu. (Nujol) 1692 cm.-1 XXXII (R = H) (500 mg.) and 500 mg. PhOH dissolved in 5 ml. AcOH by heating, the soln. treated with 15 ml. 85% H3PO4, stirred 2 hrs. at 120.degree., poured onto ice, extd. with Et2O, the ext. washed with H2O, dried, evapd. in vacuo, and the viscous residue dissolved in MeOH, the soln. treated with excess Et2O-CH2N2, kept 1 day, fractionated, and the distillate [560 mg., b0.001 190-210.degree., m. 145-7.degree. (MeOH)] recrystd. from EtOAc gave 340 mg. XXXIII, m. 147-8.degree., .lambda. (EtOH) 281 m.mu. (log .epsilon. 3.62, .nu. (Nujol) 1722 cm.-1 and .nu. (CH2Cl2) 1728 cm.-1 XVIIa (20 g.) in 300 ml. AcOH hydrogenated over 2 g. 10% Pd-C at room temp. and atm. pressure, after absorption of 2.2 l. H the soln. filtered, and evapd. gave 17.8 g. XXXIII, m. 145-6.degree. (MeOH), identical (mixed m.p. and ultraviolet and infrared spectra) with XXXIII prepd. above. XVIII (4 g.)

in 25 ml. 2N NaOH treated at 50.degree. with 240 ml. 5% aq. KMnO4 in portions of 20 ml. with stirring, the pptd. MnO2 brought into soln. by means of SO2, the soln. acidified with concd. HCl, extd. with Et2O, the Et2O soln. washed with H2O, extd. exhaustively with aq. KHCO3, the alk. exts. acidified, extd. with Et2O, the ext. washed, dried, evapd., and the residue (1.2 g.) esterfied with Et2O-CH2N2, and the product fractionated gave 220 mg. 3,4(MeO)2C6H3CO2Me, b0.001 110-30.degree., m. 57-8.degree. (after 2 redistns.), 102 mg. intermediate fraction, and then the main fraction, which was filtered through silica gel in Et2O soln. and crystd. from C6H6-cyclohexane to give 390 mg. 2,3,4,5-MeCO2(MeO)3C6HCOC6H3(MeO)2-3,4, m. 134.degree., .lambda. (EtOH) 233, 281, and 313 m.mu. (log .epsilon. 4.42, 4.10, and 4.08), .nu. (CH2Cl2) 1728 and 1658 cm.-1 DL-XXVI (3 g.) suspended in 150 ml. 2N H2SO4 stirred 1 hr. at 100.degree., cooled, extd. with CHCl3, the ext. washed with dil. aq. Na2CO3 and H2O, dried, and evapd., and the residual neutral fraction chromatographed on silica gel and the column eluted with CH2Cl2 gave 650 mg. DL-.beta.-XXVII, m. 223-4.degree. (EtOH); further elution with CHCl3 contg. 2% MeOH gave 1.21 g. DL-isosikkimotoxin (XXXIV), m. 256-7.degree. (EtOH, then CHCl3-EtOH, then EtOH), .lambda. (EtOH) 276.5 m.mu. (log .epsilon. 3.58), .nu. (Nujol) 3450 nd 1750 cm.-1 and .nu. (CHCl3) 1784 cm.-1; the product from the mother liquors from the crystn. of DL-XXXIV acetylated with Ac2O in pyridine at room temp. gave 310 mg. XXIX, m. 189-90.degree. (CHCl3-EtOH), .nu. (CH2Cl2) 1784 and 1738 cm.-1, its UV like that of DL-XXXIV. DL-XXVI heated in portions of 500 mg. in a preheated oil bath at various times and temps. and the neutral fraction isolated gave these results: after 0.5 hr. at 180.degree., 300 mg. neutral fraction from which 220 mg. LD-XXXIV was isolated; after 1 hr. at 170.degree., 340 mg. neutral fraction which gave 280 mg. DL-XXXIV; after 0.5 hr. at 240.degree., 450 mg. neutral fraction, from which no pure DL-XXXIV could be isolated.

After 1 and 20 hrs. in boiling xylene, 500 mg. portions DL-XXVI yielded 290 and 280 mg. neutral fractions, resp., from which were isolated 260 and 240 mg. DL-XXXIV, resp. DL-XXVI (5 g.) dissolved in 100 ml. HCONMe2 by heating, the soln. dild. with 200 ml. dioxane, treated with 2.5 g. dicyclohexylcarbodiimide in 10 ml. dioxane, stirred 3 hrs. at room temp., evapd. in vacuo, and the residue crystd. from CHCl3 gave 1.5 g. N,N'-dicyclohexylurea, m. 228-30.degree.; the filtrate evapd. and the residue crystd. from MeOH gave 4.05 g. DL-XXXIV, m. 260-1.degree. (CHCl3-EtOH). DL-XXXIV (1 g.) suspended in 20 ml. N NaOH stirred 2 hrs. at 100.degree. and the resulting soln. acidified with 25 ml. N HCl gave DL-XXVI, m. 232.degree. (decompn.) (EtOH). DL-XXXIV (500 mg.) suspended in 75 ml. CHCl3 refluxed and stirred 2.5 hrs. with 3.5 g. MnO2, the soln. filtered, and evapd. in vacuo gave 300 mg. DL-isosikkimotoxone, m. 199-200.degree. (CH2Cl2-MeOH), .lambda. (EtOH) 233, 276, and 312 m.mu. (log .epsilon. 4.48, 4.06, and 3.88), .nu. (Nujol) 1784 and 1686 cm.-1 Acetylation of DL-XXXIV with Ac2O in pyridine at room temp. or 100.degree. and by heating with Ac2O alone gave DL-XXVIII, m. 240-1.degree. (CHCl3-EtOH), its UV like that of DL-XXXIV, .nu. (CH2Cl2) 1784 and 1738 cm.-1, giving DL-XXVI on sapon. DL-XXXIV (1 g.) in 16 ml. AcOH and 8 ml. Ac2O boiled 1 hr., evapd. in vacuo, and the residue crystd. from EtOH gave 280 mg. DL-XXVIII, m. 240-1.degree.; from the mother liquor was isolated 420 mg. DL-XXIX, m. 191-2.degree. (EtOAc, then EtOH, then EtOAc), its UV like that of DL-XXXIV, .nu. (CH2Cl2) 1780 and 1736 cm.-1 DL-XXIX (1.2 g.) heated 4 hrs. at 100.degree. with 25 ml. N NaOH, the soln. dild. with 20 ml. H2O, and acidified with 30 ml. N HCl with cooling gave 820 mg. DL-epiisosikkimotoxic acid (XXXIVa), m. 191-2.degree. (decompn.) (EtOH), .lambda. (EtOH) 279 m.mu. (log .epsilon. 3.58), .nu. (Nujol) 3450, 3370, and 1705 cm.-1 Pyrolysis of 300 mg. DL-XXVIII (0.5 hr. at 250.degree./11 mm.) followed by distn. in vacuo gave 250 mg. DL-.beta.-XXVII, m. 224-5.degree. (CHCl3-EtOH). Similar pyrolysis of 300 mg. DL-XXIX gave 245 mg. DL-.beta.-XXVII, m. 224-5.degree.. Finely powd. DL-XXVI (3 g.) suspended in 100 ml. Et2O treated with excess Et2O-CH2N2 with stirring and cooling, kept 2 days at 5.degree., evapd. in vacuo, the residue

dissolved in CHCl3, the soln. washed with cold dil. aq. NaOH and H2O, dried, evapd. in vacuo, and the residue (2.95 g.) chromatographed on silica gel and the column eluted with CH2Cl2 contg. 1.0% MeOH gave 105 mg. DL-XXXIV, m. 257-8.degree. (CHCl3-EtOAc); further elution with CHCl3 contg. 2% MeOH gave 2.0 g. Me ester of DL-XXVI, m. 188-9.degree. (CH2Cl2-MeOH), .lambda. (EtOH) 278.5 m.mu. (log .epsilon. 3.57), .nu. (Nujol) 3520, 3420, and 1724 cm.1 [Ac deriv. m. 161-2.degree. (EtOH), its UV like that of DL-XXXIV, .nu. (Nujol or CH2Cl2) 1732 cm.-1]. DL-.beta.-XXVII (15 g.) suspended in 50 ml. EtOH and 75 ml. 2N NaOH refluxed and stirred 2 hrs., the resulting soln. concd. in vacuo to 50 ml., dild. with 50 ml. H2O, made acid to Congo with 18% HCl with stirring and ice cooling, extd. with CH2Cl2, the ext. washed neutral with H2O, dried, concd. in vacuo at 40.degree. to small vol. and dild. with Et2O gave 14.2 g. DL-.alpha.-apopicrosikkimotoxic acid (XXXV), m. 157-8.degree. (decompn.) (CH2Cl2-Et2O), .lambda. (EtOH) 214 and 285 m.mu. (log .epsilon. 4.59 and 3.97), .nu. (Nujol or KBr) 1726 and 3330 cm.-1 DL-.alpha.-XXXV (2 g.) in 100 ml. 2N H2SO4 heated within 30 min. to 100.degree., stirred 1 hr. at 100.degree., and the soln. cooled in ice gave 1.02 g. DL-.alpha.-apopicrosikkimotoxin (XXXVI), m. 222-3.degree. (sinters at 200.degree.), .lambda. (0.001N alc.-HCl) 285 m.mu. (log .epsilon. 3.91), .nu. (Nujol) 1770 cm.-1 and .nu. (CH2Cl2) 1780 cm.-1 DL-.alpha.-XXXV (5 g.) in 50 ml. abs. CH2Cl2 stirred 1 hr. with 2.5 g. dicyclohexylcarbodiimide in CH2Cl2, the soln. filtered, and evapd. in vacuo gave 4.6 g. DL-.alpha.-XXXVI, m. 222-3.degree. (sinters at 190-200.degree.) (MeOH). DL-XXXVI (500 mg.) heated 15 min. at 200.degree. and distd. at 220-30.degree./0.001 mm. gave 480 mg. DL-.beta.-XXVII, m. 224-5.degree.. DL-.alpha.-XXXVI (5 g.) in 50 ml. abs. CH2Cl2 and 50 ml. AcOH satd. with HCl with stirring and ice-salt cooling, kept overnight at 0.degree., poured onto ice, extd. with CH2Cl2, the ext. washed with ice H2O, cold aq. KHCO3, and ice H2O, dried, evapd. in vacuo, and the residue dissolved in 50 ml. Me2CO, the soln. treated with 50 ml. H2O and 5 g. CaCO3, refluxed and stirred 2 hrs., cooled, the CaCO3 dissolved with dil. HCl, the mixt. extd. with CHCl3, the ext. washed with dil. aq. KHCO3 and H2O, dried, evapd. in vacuo, and the residue (4.1 g.) chromatographed on silica gel, and the column eluted with CHCl3 gave a mixt. of DL-.alpha.-XXXVI and DL-.beta.-XXVII, which yielded 480 mg. DL-.beta.-XXVII, b0.001 220-30.degree., m. 224-5.degree., after distn.; the column eluted with CHCl3 contg. 1% MeOH and the product crystd. from MeOH gave 2.95 g. DL-II, m. 178-9.degree. (CHCl3-EtOH, then EtOAc), .lambda. (EtOH) 280 m.mu. (log .epsilon. 3.65), .nu. (CH2Cl2) 1772 cm.1; from the mother liquor was isolated 430 mg. DL-epipicrosikkimotoxin (XXXVII), m. 191-2.degree. (MeOH, then EtOAc), its UV like that of DL-II, .nu. (CH2Cl2) 1765 cm.-1 O-Ac deriv. of DL-II, m. 185-6.degree. (MeOH), its UV like that of DL-II, .nu. (CH2Cl2) 1774 and 1730 cm.-1 O-Ac deriv. of DL-XXXVII m. 179-80.degree. (MeOH), its UV like that of DL-II, .nu. (CH2Cl2) 1766 and 1736 cm.-1 DL-II (300 mg.) in 10 ml. CHCl3 refluxed and stirred 2 hrs. with 1.5 g. MnO2, the ppt. filtered off, washed with CHCl3, the filtrate evapd., and the residue dissolved in CH2Cl2 and the soln. filtered through Al2O3 gave 210 mg. DL-picrosikkimotoxone (XXXVIII), m. 188-9.degree. (MeOH), .lambda. (EtOH) 236,282, and 318 m.mu. (log .epsilon. 4.42, 4.08, and 3.92), .nu. (CH2Cl2) 1776 and 1668 cm.-1 DL-XXXVII (100 mg.) oxidized as above with 500 mg. MnO2 in 5 ml. CHCl3 gave 60 mg. DL-XXXVIII, m. 187-8.degree. (MeOH). DL-II (500 mg.) in 5 ml. Me2CO and 10 ml. N HCl refluxed 0.5 hr., dild. with H2O, the product (mixt. of 3 compds.) isolated with CHCl3, chromatographed on silica gel, and the column eluted with CH2Cl2 gave 30 mg. DL-.beta.-XXVII, m. 212-13.degree. (MeOH); clution with CH2Cl2 contg. 1% MeOH gave first 280 mg. DL-XXXVII, m. 190-1.degree. (EtOH, then MeOH, then EtOAc), and then 85 mg. unchanged DL-II, m. 178-9.degree. (EtOAc). DL-.alpha.-XXXV (17.2 g.)in 200ml. MeOH mixed with 12 g. cinchonine (XXXIX) in 100 ml. MeOH and 100 ml. CH2Cl2, the soln. concd. to 75 ml., dild. with 100 ml. Me2CO, boiled briefly, and cooled gave 13.7 g. (-)-.alpha.-XXXV XXXIX salt (XL),

m. 204-5.degree. (decompn.) (MeOHMe2CO), [.alpha.]D -101.degree. (CHCl3); from the mother liquor was isolated an addnl. 1.2 g. XL, m. 201-2.degree. (decompn.), [.alpha.]D -98.degree. (CHCl3). XL (20 g.) shaken with dil. HCl and CH2Cl2 and the org. ext. evapd. gave 11.5 g. (-)-.alpha.-XXXV, noncryst., [.alpha.]D -172 .+-. 5.degree. (CHCl3), its UV like that of DL-.alpha.-XXXV. Crude (-)-.alpha.-XXXV (10 g.) in 100 ml. abs. CH2Cl2 treated with 4.8 g. dicyclohexylcarbodiimide, stirred 2 hrs. at room temp., the ppt. filtered off, the filtrate concd. in vacuo, and dild. with MeOH gave 8.7 g. (+)-.alpha.-XXXVI, m. 165-6.degree., [.alpha.]D 66.degree.(CHCl3), its ultraviolet and infrared spectra like that of DL-.alpha.-XXXVI. (-)-.alpha.-XXXV (500 mg.) distd. at 230.degree./0.001 mm. gave 450 mg. (+)-.beta.-XXVII, resin, [.alpha.]D 77.degree.(CHCl3), its ultraviolet and infrared spectra like that of DL-.beta.-XXVII. (+)-.alpha.-XXXVI (200 mg.) distd. at 230.degree./0.001 mm. gave (+)-.beta.-XXVII, colorless glass, which was pptd. from CH2Cl2 with petr. ether to give amorphous (+)-.beta.-XXVII, m. 120.degree. to 145-50.degree., [.alpha.]D 78.degree. (CHCl3). (+)-.alpha.-XXXVI (9.1 g.) in 120 ml. abs. CH2Cl2 and 100 ml. AcOH satd. with HCl with stirring and ice-salt cooling, kept 3 hrs. at 0.degree., poured onto ice, extd. with CH2Cl2, the ext. washed with ice H2O, cold aq. KHCO3, and ice H2O, dried, evapd. in vacuo, the residue dissolved in 150 ml. Me2CO, the soln. treated with 150 ml. H2O and 10 g. CaCO3, refluxed and stirred 2 hrs., cooled, treated with dil. HCl to dissolve the CaCO3, extd. with CHCl3, the ext. washed with dil. Na2CO3 and H2O, dried, evapd. in vacuo, the residue (9 g.) chromatographed on silica gel, and the column eluted with CH2Cl2 gave a mixt. of .alpha.-XXXVI and .beta.-XXVII, which was distd. at 230.degree./0.001 mm. to give 1.6 g. (+)-.beta.-XXVII, amorphous, [.alpha.]D 76.degree. (CHCl3); further elution with CHCl3 contg. 1% MeOH gave 5.44 g. (-)-II, m. 148-9.degree. (EtOH-Et2O), [.alpha.]D -5.5.degree. (CHCl3) and -1.degree. (Me2CO), .lambda. (EtOH) 280 m.mu. (log .epsilon. 3.60), .nu. (CH2Cl2) 1772 cm.-1; from the mother liquor of (-)-II was isolated 1.5 g. crude (+)-XXXVII, [.alpha.]D 30.degree. (CHCl3), .lambda. (EtOH) 279 m.mu. (log .epsilon. 3.62), .nu. (CH2Cl2) 1764 cm. -1 Crystn. of (-)-II from EtOH-H2O gave (-)-II.H2O, m. 92-4.degree. (foaming). (-)-II kept at room temp. with Ac2O in pyridine gave O-Ac deriv. of (+)-II, m. 144-5.degree. (MeOH-Et2O), [.alpha.]D 10.6.degree. (CHCl3), its ultraviolet and infrared spectra like that of II and XXXVIIa, resp. Crude (+)-XXXVII treated similarly gave O-Ac deriv. of (-)-XXXVII, m. 192-3.degree. (EtOH), [.alpha.]D -16.degree. (CHCl3); on prolonged standing the EtOH mother liquor deposited 20% O-Ac deriv. of (+)-II, m. 142-3.degree., [.alpha.]D 8.5.degree. (CHCl3). (-)-II (500 mg.) in 5 ml. Me2CO and 10 ml. N HCl refluxed 0.5 hr., dild. with H2O, the product isolated with CHCl3, chromatographed on silica gel, and the column eluted with CH2Cl2 gave 30 mg. DL-.alpha.-XXXVI; elution with CH2Cl2 contg. 1% MeOH gave (from the first 3 20-ml. eluates) 150 mg. (+)-XXXVII, noncryst., [.alpha.]D 54.degree. (CHCl3), and from the succeeding fractions (whose rotation fell to 14.degree.) unchanged (-)-II, m. 145-7.degree. (EtOH-Et2O), [.alpha.]D -5.degree. (CHCl3). The residue (50.8 g.) from the mother liquor of XL dissolved in 500 ml. CH2Cl2, the soln. washed 3 times with 250 ml. 2N HCl and ice and then 3 times with 150 ml. ice-H2O, the H2O washings reextd. twice with 150 ml. CH2Cl2, the combined org. solns. dried, and evapd. in vacuo gave 30 g. crude (+)-XXXV, [.alpha.]D 115.degree.(CHCl3), which deposited 8.0 g. (.+-.)-.alpha.-XXXV, m. 151-2.degree. (decompn.), [.alpha.]D 0.degree. (CHCl3), from CH2Cl2-Et2O on prolonged standing; from the mother liquor was isolated 22 g. (+)-.alpha.-XXXV, [.alpha.]D 150.degree. (CHCl3). Crude (+)-.alpha.-XXXV (51 millimoles) in 100 ml. CH2Cl2 mixed with 9.5 g. (-)-ephedrine (XLI) in 50 ml. CH2Cl2 and evapd. in vacuo gave 24.4 g. (+)-.alpha.-XXXV (-)-XLI salt (XLII), m. 147-9.degree. (Me2CO-cyclohexane, then CH2Cl2C6H6), [.alpha.]D 219.degree. (CHCl3). XLII (17.9 g.) treated with dil. HCl and CH2Cl2 and the CH2Cl2 layer evapd. gave 12.9 g. (+)-.alpha.-XXXV, noncryst., [.alpha.]D 170.degree. (CHCl3). Crude (+)-.alpha.-XXXV (12.9

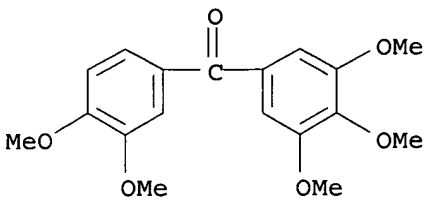
g.) in 100 ml. CH2Cl2 treated with 6.2 g. dicyclohexyl-carbodiimide in 25 ml. CH2Cl2, stirred 2 hrs. at room temp., filtered, the filtrate concd. in vacuo to small vol., and dild. with MeOH gave 9.9 g. (-)-.alpha.-XXXVI, m. 163-4.degree. (CH2Cl2-MeOH), [.alpha.]D -65.degree. (CHCl3), its ultraviolet and infrared spectra like that of DL-.alpha.-XXXVI. (-)-.alpha.-XXXVI (500 mg.) distd. at 230.degree./0.001 mm. gave (-)-.beta.-XXVII, colorless glass, which was isolated as an amorphous ppt. by pptn. from CH2Cl2 with petr. ether, [.alpha.]D -77.degree. (CHCl3), its ultraviolet and infrared spectra like that of DL-.beta.-XXVII. (-)-.alpha.-XXXVI (8.2 g.) in 100 ml. abs. CH2Cl2 and 75 ml. AcOH satd. with HCl with stirring and ice-salt cooling, kept 3 hrs. at 0.degree., poured onto ice, extd. with CH2Cl2, the ext. washed with ice H2O, cold aq. KHCO3, and ice H2O, dried, evapd. in vacuo, the residue dissolved in 100 ml. Me2CO, the soln. treated with 100 ml. H2O and 10 g. CaCO3, refluxed and stirred 2 hrs., cooled, treated with dil. HCl to dissolve the CaCO3, extd. with CHCl3, the ext. washed with dil. aq. Na2CO3 and H2O, dried, evapd. in vacuo, and the residue chromatographed on silica gel and the column eluted with CH2Cl2 gave (from the initial fraction) a mixt. of .alpha. and .beta.-isomers, which was distd. at 230.degree./0.001 mm. to give 985 mg. (-)-.beta.-XXVII, amorphous, [.alpha.]D -76.degree. (CHCl3); continued elution gave 1.5 g. mixt. of compds.; further elution with CHCl3 contg. 2% MeOH gave 6.5 g. mixt. of compds., which was crystd. from EtOH-Et2O to give 4.4 g. (+)-II, m. 148-9.degree. (MeOH-Et2O), [.alpha.]D 6.6.degree. (CHCl3), and, from the mother liquor, 1.5 g. (-)-XXXVII, noncryst., [.alpha.]D -30.degree. (CHCl3). (+)-II (250 mg.) treated with Ac2O in pyridine at room temp. gave 260 mg. O-Ac deriv. of (-)-II, m. 144-5.degree. (EtOH-Et2O), [.alpha.]D -10.5.degree. (CHCl3), its ultraviolet and infrared spectra like that of the (+)-analog. From crude (-)-XXXVII was similarly prepd. O-Ac deriv. of (+)-XXXVII, m. 190-1.degree. (EtOH), [.alpha.]D 15.1.degree. (CHCl3), its ultraviolet and infrared spectra like that of the (-)-analog; from the mother liquor was obtained by diln. with Et2O 25% O-Ac deriv. of (-)-II, m. 143-5.degree., [.alpha.]D -10.degree. (CHCl3). (-)-II (500 mg.) in 10 ml. AcOH hydrogenated over 200 mg. 10% Pd-C at 50.degree. and atm. pressure, after absorption of 30 ml. H the soln. filtered, and evapd. in vacuo gave 370 mg. deoxypicrosikkimotoxin (XLIII), m. 148-9.degree. (EtOH), [.alpha.]D 5.4.degree. (CHCl3), .lambda. (MeOH) 282 m.mu. (log .epsilon. 3.68), .nu. (CH2Cl2) 1768 cm.-1 III (25 g.) in 1 l. AcOH hydrogenated over 7 g. 10% Pd C at 60.degree. and atm. pressure using a vibromixer (1550 ml. H absorbed in 2.5 hrs.) gave 21.8 g. deoxypicropodophyllin (XLIV), m. 164-5.degree. (EtOH, then CHCl3MeOH), [.alpha.]D 34.degree. (CHCl3), .lambda. (MeOH) 290 m.mu. (log .epsilon. 3.72), .nu. (CH2Cl2) 1766 cm.-1 XLIV (2 g.) and 2 g. PhOH in 20 ml. AcOH mixed with 60 ml. 83% H3PO4, heated and stirred 2 hrs. at 120.degree., cooled, poured onto ice, extd. with Et2O, the ext. washed with H2O, dried, evapd. and the residue heated in vacuo at 200.degree. and crystd. from EtOH gave 1.2 g. demethylenedeoxypicropodophyllin (XLV), m. 225-6.degree. (CHCl3-EtOH), [.alpha.]D 54.8.degree. (EtOH), .lambda. (MeOH) 287.5 m.mu. (log .epsilon. 3.71), .nu. (Nujol) 3400 and 1720 cm.-1; di-O-Ac deriv. m. 147-8.degree. (EtOH-Et2O), [.alpha.]D 22.5.degree.(CHCl3), .lambda. (MeOH) 270 m.mu. (log .epsilon. 3.35), .nu. (CH2Cl2) 1770 cm.-1 XLV (1 g.) suspended in a small amt. MeOH kept 1 day at room temp. with excess Et2O-CH2N2 with occasional shaking, evapd. in vacuo, and the residue crystd. from Et2O gave XLIII, m. 121-2.degree. (solidi-fies and then m. 147-9.degree.), [.alpha.]D 4.5.degree. (CHCl3); recrystn. from EtOH gave directly XLIII, m. 148-9.degree., [.alpha.]D 6.0.degree. (CHCl3), identical with XLIII prepd. by hydrogenation of (-)-II. Additional information in printed abstract.

IT **22699-97-4**, Benzophenone, 3,3',4,4',5-pentamethoxy-
(prepn. of)

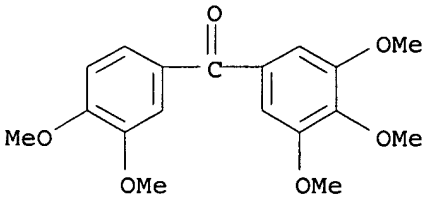
RN 22699-97-4 CAPLUS

CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX

NAME)



L7 ANSWER 10 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1962:462460 CAPLUS
DN 57:62460
OREF 57:12371c-e
TI Lignans. II. Synthesis of benzophenones as intermedi-ates for the synthesis of lignans
AU Diwadkar, A. B.; Shroff, H. D.; Kulkarni, A. B.
CS Inst. Sci., Bombay
SO Current Science (1962), 31, 149-50
CODEN: CUSCAM; ISSN: 0011-3891
DT Journal
LA Unavailable
AB cf. J. Sci. Ind. Res (India) 20B, 599(1961). Condensation of isovanillic acid with guaiacol (I) by means of polyphosphoric acid gave 35% 3,4-MeO(HO)C6H3COC6H3(OH)OMc-3,4, m. 178.degree.; 2,4-dini-trophenylhydrazone m. 243.degree.. Similar condensation of various reactants gave the following results (reactants, compd. formed, % yield, m.p., m.p. 2,4-dinitrophenylhy-drazone given): veratric acid and veratrole (II), [3,4-(MeO)2C6H3] 2CO, 98, 145.degree., -; trimethylgallic acid and II, 3,4,5-(MeO)3C6H2COC6H3(OMe)2-3,4, 95, 120.degree., -; piperonylic acid and II, 3,4-CH2O2C6H3COC6H3(OMe)2-3,4, -, 165.degree., 241.degree.; anisic acid (III) and II, 3,4-(MeO)2C6H3COC6-H4OMe-4 (IV), 98, 100.degree., -; III and I, 3,4-(MeO)2C6H3-COC6H4OH-4 (V), 44, 114.degree., 233.degree. (methylation of V gave IV, m. 100.degree.).
IT **22699-97-4**, Benzophenone, 3,3',4,4',5-pentamethoxy- (prepn. of)
RN 22699-97-4 CAPLUS
CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)



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AN 1962:24851 CAPLUS
DN 56:24851
OREF 56:4654d-i,4655a-b
TI Lignans. I. Acylation in polyphosphoric acid as a route to intermediates
AU Ayres, D. C.; Denney, R. C.
CS John Cass Coll., London
SO Journal of the Chemical Society, Abstracts (1961) 4506-9

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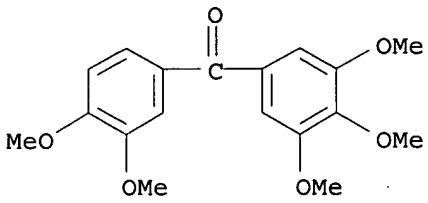
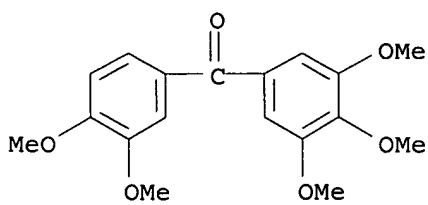
LA Unavailable
OS CASREACT 56:24851
AB Phenols and their ethers with alkoxybenzoic acids in polyphosphoric acid (PPA) gave esters and benzophenones, resp., the latter being intermediates in prospective syntheses of phenyltetrahydronaphthalene lignans. Phosphorylation was found to affect the course of some reactions. PPA was prepd. by mixing P2O5 8 with 90% H3PO4 (d. 1.75) 5 parts and stirring 30 min. at 85.degree. before use. Vanillic acid (I) (5.0 g.) and 4.1 g. veratrole (II) stirred into PPA (from 50 g. P2O5) and the soln. kept 30 min. at 80-3.degree. and poured into 250 ml. ice H2O gave 8.0 g. 4-hydroxy-3,3',4'-trimethoxybenzophenone (III), m. 142-3.degree. (1:1 EtOH-H2O), .nu. 3300 and 1669 cm.-1 III (1.0 g.) in 3% aq. NaOH shaken 15 min. at room temp. with 1.0 g. Me2SO4 gave 0.81 g. [3,4-(MeO)2C6H3]2CO, m. 144.degree. (EtOH), .nu. 1635 cm.-1 3,4,5-(MeO)3C6H2CO2H (IV) (4.6 g.) and 3.0 g. III in PPA (from 35 g. P2O5) treated as above gave 6.9 g. 3,4,5-(MeO)3C6H2COC6H3(OMe)2-3,4, m. 118-19.degree. (EtOH), .nu. 1630 cm.-1 I (5 g.) and 3.2 g. PhOMe in PPA (from 50 g. P2O5) gave 8 g. 3,4-MeO(HO)C6H3COC6H4OMe-4 (V), m. 109-10.degree., .nu. 3300 and 1635 cm.-1 V (1.0 g.) methylated with 0.8 g. Me2SO4 as above and the mixt. heated 30 min. on a H2O bath gave 0.80 g. 3,4-(MeO)2C6H3COC6H4OMe-4, m. 98-9.degree. (1:1 EtOH-H2O), .nu. 1636 cm.-1 IV (10.6 g.) and 8.4 g. 1,2,3-C6H3(OMe)3 (VI) in PPA (from 88 g. P2O5) treated as above gave 16.3 g. 2,3,4-(MeO)3C6H2COC6H2(OMe)3-3,4,5 (VII), m. 121.degree. (aq. EtOH), .nu. 1650 cm.-1 1,2-CH2O2C6H4 (0.50 g.) in PPA stirred 2 hrs. at 20-2.degree. and the mixt. dild. with H2O gave 2 polymeric products, one (0.26 g.) by Et2O extn. and the other (0.11 g.) by subsequent C6H6 extn. o-C6H4(OH)2 (VIII) (13.0 g.) and 25.0 g. IV in PPA (from 200 g. P2O5) heated and stirred 40 min. at 85.degree. and poured into 400 ml. ice H2O gave 33 g. 2-HOC6H4O2CC6H2(OMe)3-3,4,5 (IX), m. 178-9.degree. (1:1 EtOH-H2O), .nu. 3450 and 1736 cm.-1 Repetition of this expt. with 11.0 g. VIII and 42.4 g. IV and the product (35 g.) washed with aq. NaHCO3 gave 30 g. IX. VIII and 4,3,5-HO(MeO)2C6H2CO2H (X) (each 0.05 mole) treated as above gave 75% 4,3,5-HO(MeO)2C6H2CO2C6H4OH-2, m. 212.degree. (1:1 EtOH-H2O), .nu. 3350 and 1725 cm.-1 1,2-CPh2O2C6H3 (Mason, CA 39, 40642) (3.0 g.) and 2.32 g. IV in PPA (from 25 g. P2O5) treated as above (35 min. at 85.degree.) gave 4.9 g. IX, m.p. and mixed m.p. 176-7.degree. (4:1 EtOH-H2O). VIII and IV (each 0.02 mole) refluxed 5 hrs. in 40 ml. Et2O contg. 45% BF3, the mixt. cooled, treated with 100 ml. H2O, the Et2O distd., the hot liquor decanted from 2 g. insol. oil, and the latter crystd. from 1:1 EtOH-H2O gave IX, m. 179.degree.; methylation of 1.0 g. IX gave 0.70 g. 2-MeOC6H4O2CC6H2(OMe)3-3,4,5, m. 113.degree. (EtOH), an identical compd. being obtained on methylation of X prepd. above. VIII (2.5 g.) and 10.5 g. 3,4,5-(MeO)3C6H2COCl kept molten 2 hrs., the melt cooled, and the solid washed with aq. NaHCO3 gave 11.4 g. o-C6H4[O2CC6H2(OMe)3-3,4,5]2 (XI), m. 154.degree. (1:1 C6H6-petr. ether). XI (4.0 g.) in 70 ml. PhNO2 heated 4 hrs. on a steam bath with 3.5 g. AlCl3 and the mixt. cooled, acidified with 20 ml. 5N HCl, and steam distd. gave 2.8 g. X, m. 203.degree.; VIII was present in the steam distillate (FeCl3 test). Gallic acid (XII) (4.0 g.) and 3.95 g. VI stirred in PPA (from P2O5), the soln. kept 1 hr. at 90.degree., poured into 100 ml. ice H2O, the ppt. (0.5 g.) filtered off, the filtrate extd. with Et2O (the ext. contained 2.2 g. material; the ppt. and the extd. material were a mixt. of XII and VI, predominantly VI), the aq. filtrate refluxed 2 hrs. with 200 ml. 2N HCl, and the product isolated with Et2O gave 2.7 g. 3,4,5-(HO)3C6H2COC6H2(OMe)3-2,3,4, m. 181-2.degree. (1:1 EtOH-H2O), .nu. 3300 and 1663 cm.-1, methylation giving 83% VII, m. 121-2.degree.. 2-MeOC6H4OH (XIII) and I (each 0.03 mole) in PPA (from 50 g. P2O5) heated 30 min. at 80.degree., poured into 250 g. ice H2O, and the mixt. worked up gave 74% recovered I and 60% recovered XIII; no ketone was detected.
IT **22699-97-4**, Benzophenone, 3,3',4,4',5-pentamethoxy-

(prepn. of)
RN 22699-97-4 CAPLUS
CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)



L7 ANSWER 12 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1961:54194 CAPLUS
DN 55:54194
OREF 55:10398d-g
TI Polyoxyphenols of Western red cedar (Thuja plicata). II. Degradation studies on plicatic acid, a possible lignan acid
AU Gardner, J. A. F.; MacDonald, B. F.; MacLean, Harold
CS Dept. Northern Affairs and Natl. Resources, Ottawa
SO Canadian Journal of Chemistry (1960), 38, 2387-94
CODEN: CJCHAG; ISSN: 0008-4042
DT Journal
LA Unavailable
AB cf. CA 54, 6120i. Plicatic acid, C20H22O10, a polyoxyphenol from western red cedar heartwood, described previously, loc. cit., was further characterized by prepn. and analysis of addnl. cryst. derivs. Cryst. tri-Me and tri-Et ethers were oxidized by alk. permanganate. The tri-Me ether yielded 3,4,5-trimethoxybenzoic acid, 4,5-dimethoxyphthalic acid, a pentamethoxy anthraquinone, and a pentamethoxy o-benzoylbenzoic acid which decarboxylated to 3,3',4,4',5-pentamethoxybenzophenone. Correspondingly, the tri-Et ether gave 3,4-diethoxy-5-methoxybenzoic and 4-ethoxy-5-methoxyphthalic acids, a mixt. of pentaalkoxy anthraquinones and a pentaalkoxy o-benzoylbenzoic acid, which decarboxylated to 3,3,'4-triethoxy-4',5-dimethoxybenzophenone, identified by cleavage to 3-ethoxy-4-methoxybenzoic and 3,4-diethoxy-5-methoxybenzoic acids. These results fixed the positions of the 2 methoxyl, 3 phenolic hydroxyls, and mode of linkage of the two benzene rings. Further evidence indicated that plicatic acid was probably a lignan of the 4-aryl-tetrahydronaphthalene series.
IT **22699-97-4**, Benzophenone, 3,3',4,4',5-pentamethoxy-
(prepn. of)
RN 22699-97-4 CAPLUS
CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)



L7 ANSWER 13 OF 13 CAPLUS COPYRIGHT 2003 ACS on STN

CAS ONLINE PRINTOUT

AN 1959:44983 CAPLUS
DN 53:44983
OREF 53:8063b-i,8064a-i
TI Reformatskii reaction in syntheses of .omega.,.omega.-diarylalkanoic acids and related compounds
AU Klemm, L. H.; Bower, G. M.
CS Univ. of Oregon, Eugene
SO Journal of Organic Chemistry (1958), 23, 344-8
CODEN: JOCEAH; ISSN: 0022-3263
DT Journal
LA Unavailable
OS CASREACT 53:44983
AB Ph2CO and various MeO-substituted benzophenones were submitted to the Reformatskii reaction with BrCH2CO2Et (I) and BrCH2CH:CHCO2Me (II), and an attempt made to correlate the data obtained with others quoted in the literature. Following the general procedure of Gardner (C.A. 49, 12358c) 57 g. p-MeOC6H4CO2H and 41 g. MeOPh stirred 2 hrs. at 70.degree. with 540 g. polyphosphoric acid, the mixt. poured into ice H2O, the ppt. washed with 500 ml. 5% aq. NaOH and with H2O, and the dried product crystd. (alc.) yielded 75-4, g. (p-MeOC6H4)2CO (III), m. 144-6.degree.. Similarly 41 g. 3,4,5-(MeO)3C6H2CO2H, 25 g. 1,2-(MeO)2C6H4, and 430 g. polyphosphoric acid gave 36 g. 3,3' ,4,4' ,5-pentamethoxybenzophenone (IV). Zn (50 g., 20-mesh activated with HCl), 58.3 g. III, and a crystal of iodine in 400 ml. anhyd. C6H6 stirred under reflux with addn. of 70 g. I in 20 ml. C6H6, the mixt. refluxed 15 min. and dild. with 200 ml. 10% AcOH, the aq. layer extd. with C6H6, the combined org. solns. washed (H2O, excess 1.5% NH4OH, H2O), dried (MgSO4), and evapd. gave 55 g. RR'C(OH)CH2CO2Et (V, R = R' = p-MeOC6H4) (VI), m. 92-3.degree. (EtOAc). VI (14.4 g.) in 140 ml. warm dry C6H6 and 20 ml. anhyd. HCO2H refluxed 5 min., the C6H6 removed in a current of air, the residual unsatd. ester hydrogenated 30 min. in 90 ml. AcOH at 3.5-4.0 atm. with 2.5 g. 5% Pd-C, the filtered soln. evapd., and the residue crystd. yielded 83% RR'CHCH2CO2Et (VII, R = R' = p-MeOC6H4) (VIII), m. 49.5-50.5.degree. (abs. alc.), hydrolyzed 1 hr. by refluxing with 3% KOH in 75% alc., the concd. soln. acidified with HCl, and the ppt. recrystd. (abs. alc.) to give 97% RR'CHCH2CO2H (IX, R = R' = p-MeOC6H4) (X), m. 138.5-9.5.degree.. Similar hydrolysis of the residual unsatd. ester (from dehydration of 5 g. VI) yielded 4.1 g. (p-MeOC6H4)2C:CHCO2H, m. 146.5-7.5.degree. (dil. MeOH). IV and 3-MeOC6H4Bz were similarly treated in refluxing C6H6 with I. The % yields for various methoxy-substituted benzophenones in the Reformatskii reaction with I were tabulated for comparison (position of substituents, % yield of V, and over-all % yield of IX given): none, 95, -; 2, 60-70, -; 3, 95-100, 88; 4, 78, 67; 4, 4', 69, 56; 3, 3', 4, 4', 81, -; 3, 4, 4', 5, 70, -; 3, 3', 4, 4', 5, -, 59. From these results it was anticipated that diaryl ketones would react readily with II but with lower yields due to an increasing no. of possible side reactions. Zn (4.4 g., activated 20-mesh), 20 g. Ph2CO, 55 ml. dry C6H6, 35 ml. anhyd. Et2O, and a crystal of iodine treated in 1 hr. with 10 g. II in 25 ml. C6H6, the mixt. stirred and refluxed 2 hrs. with 2 g. Zn, and treated with 45 ml. 2N AcOH, the org. layer washed (5% aq. NaHCO3 and H2O), dried (Na2SO4) and evapd., the residual oil warmed 15 min. with 2 vols. anhyd. HCO2H, the mixt. evapd. in a current of air, and the residue fractionally distd. gave 32% Ph2C:CHCH:CHCO2Me (XI), m. 86-7.degree. (MeOH), refluxed 2 hrs. with a slight excess of 2% KOH in MeOH and the soln. acidified to give a quant. yield of Ph2C:CHCH:CHCO2H, m. 190-1.degree. (PhMe). XI (15 g.) in 150 ml. AcOH hydrogenated 10 min. at 3.5-4.0 atm. with 3 g. 5% Pd-C and the filtered soln. distd. gave 97% colorless Ph2CH(CH2)3CO2Me, b0.5 145-50.degree., hydrolyzed to yield quantitatively Ph2CH(CH2)3CO2H, m. 92.5-3.5.degree. (60% alc.), converted by SOCl2 to the corresponding Ph2CH(CH2)3COCl (XII). XII (from 10 g. acid and 8 ml. SOCl2) in 250 ml. purified CS2 added through the Leonard and Sentz attachment (C.A. 48,676d) in 10 hrs. with stirring and refluxing to 2.7 g. anhyd. AlCl3 in 750 ml. CS2 with addns.

of 2.7 g. AlCl3 at 3-hr. intervals, the mixt. stirred 2 hrs. and dild. with H2O, the org. layer from the filtered mixt. distd. and the residue taken up in C6H6, the washed (excess 10% aq. K2CO3 and H2O), dried (MgSO4) soln. evapd., and the residue distd. at 190-200.degree./0.5 mm. yielded 5.47 g. 9-phenyl-5-benzosuberone (XIII), m. 71.0-1.5.degree. (dil. alc.); oxime, m. 152.5-3.5.degree. (C6H6-petr. ether). XIII (2 g.) submitted to Huang-Minlon-Wolff-Kishner reduction, the dild. mixt. extd. with C6H6, the H2O-washed and dried (MgSO4) ext. distd., and the liquid (1.2 g., b1.0 132-5.degree.) redistd. gave 5-phenylbenzosuberan (XIV), b2 149-50.degree., m. 41-5.degree.. PhMgBr (0.4 g. Mg, 2.4 g. PhBr, 75 ml. Et2O) treated slowly at 0.degree. (ice-bath) with 2 g. 5-benzosuberone (obtained by cyclization of PhCH2(CH2)3CO2H with polyphosphoric acid) in 20 ml. Et2O, the mixt. stirred 30 min. at 0.degree. and refluxed 1 hr., the mixt. hydrolyzed and the carbinol dehydrated with HCO2H according to Klemm and Ziffer (C.A. 50, 4094f), the product distd. at 1.5 mm. to give 0.4 g. colorless ketonic liquid (presumably starting material) and 1 g. KMnO4-reducing liquid. b1.5 115-35.degree., the alkenic fraction (0.9 g.) in 25 ml. AcOH hydrogenated 2 hrs. at 4 atm. with 0.1 g. prereduced PtO2, and the filtered soln. distd. yielded 0.56 g. XIV, b2 149-50.degree., .lambda. 3.26-3.52, 6.24, 6.71, 6.90, 13.35, 13.9, 14.35 .mu.. XIII (2.36 g.), 1.48 g. HCO2Et, and a few ml. C6H6 stirred and warmed with 0.5 g. NaH (N atm.), the red paste stirred 1.5 hrs. at 50.degree. in 10 ml. C6H6 and treated successively with 3 ml. AcOH and 30 ml. H2O, the H2O-washed C6H6 layer extd. with 100 ml. 10% aq. Na2CO3, the alk. ext. acidified, and the ppt. recrystd. (EtOAc) gave material, m. 101.5-2.5.degree., repeatedly recrystd. (C6H6-ligroine) to give 6-hydroxymethylene-9-phenyl-5-benzosuberone, m. 102.0-2.5.degree.. Attempts to apply the same conditions as used for Reformatskii reaction of II with Ph2CO to the reaction of II with the methoxy-substituted benzophenones found to condense readily with I gave only very small quantities of crude resinous products. An alternate pathway to the prepn. of diarylvaleric acids was investigated starting with VIII, prepd. by the Reformatskii reaction of III with I. LiAlH4 (3.3 g.) in 400 ml. anhyd. Et2O stirred with addn. of 29 g. VIII in 110 ml. Et2O at a rate to maintain gentle refluxing, the mixt. refluxed 1 hr., treated cautiously with EtOAc and 200 ml. cold 3N HCl, the aq. phase extd. with 150 ml. Et2, the combined Et2O solns. washed (H2O), dried (MgSO4) and evapd., the viscous residue taken up in Et2O, and the soln. kept at -5.degree. gave 85% (p-MeOC6H4)2CH(CH2)2OH (XV), m. 54-5.degree. (Et2O); 3,5-dinitrobenzoate, m. 116-17.degree. (C6H6-ligroine). XV (55 g.) in 250 ml. CCl4 at -5.degree. stirred with addn. in 2 min. of 27 g. freshly distd. PBr3, the mixt. stirred 30 min. and the soln. kept at room temp. overnight, warmed 20 min. at 50.degree. and dild. with H2O, the aq. phase extd. with CCl4, the combined CCl4 solns. washed repeatedly with H2O, the dried soln. (CaCl2) evapd. and the residue in 200 ml. abs. alc. distd. azeotropically with 20 ml. dry C6H6 until the distg. temp. reached 78.degree., the soln. refluxed 5 hrs. with NaCH(CO2Et)2 (from 4.6 g. Na, 350 ml. abs. alc., 32 g. H2C(CO2Et)2), the decanted liquid refluxed 2 hrs. with 28 g. KOH in 100 ml. H2O, the mixt. concd., dild. with H2O, washed with Et2O and acidified, the cryst. product distd. at 240-70.degree./1 mm., and the distillate crystd. (EtOAc) gave 31% (p-MeOC6H4)2CH(CH2)3CO2H, m. 103.5-4.0.degree.. By the same procedures as used with III, 15 g. Zn, 25 g. IV, and 15 g. I gave V [R = 3,4-(MeO)2 C6H3, R' = 3,4,5-(MeO)3C6H2], dehydrated with 50 ml. anhyd. HCO2H and the resultant yellow liquid hydrogenated in 200 ml. AcOH with 2 g. 30% Pd-C to give 18 g. VII [R = 3,4-(MeO)2C6H3, R' = 3,4,5-(MeO)3C6H2], m. 81.5-82.5.degree. (abs. alc.), hydrolyzed and the product purified by 2 recrystns. (C6H6-C6H14) and drying 12 hrs. at 80.degree./1 mm. to give the acid IX [R = 3,4-(MeO)2C6H3, R' = 3,4,5-(MeO)3C6H2]. Similarly 15 g. Zn, 21.2 g. p-MeOC6H4Bz and 25 g. I gave 78% V (R = Ph, R' = p-MeOC6H4), m. 79-80.degree. (EtOAc), converted by dehydration, hydrogenation, and hydrolysis to yield 86% IX (R = Ph, R' = p-MeOC6H4), m. 120-2.degree.. Repetition of the same transformations on

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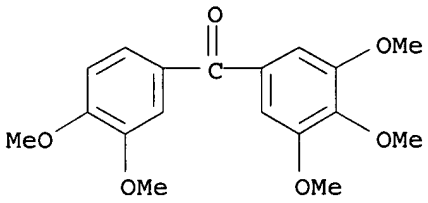
8.5 g. 3-MeOC6H4Bz produced 9.1 g. crude yellow acid, m. 92-8.degree., recrystd. (EtOAc-petr. ether) to give IX (R = Ph, R' = m-MeOC6H4), m. 99-100.degree.. Following the general procedure of Huang-Minlon (C.A. 41, 1649a), 10 g. BzCH2(CH2)2CO2H, 7.5 g. NaOH, 7.5 ml. 95% N2H4, and 80 ml. (HOCH2CH2)2O gave 8.4 g. PhCH2(CH2)3CO2H, m. 56.6-7.5.degree. (Et2O-petr. ether), identical with the product obtained by Clemmensen reduction of the starting material.

IT **22699-97-4**, Benzophenone, 3,3',4,4',5-pentamethoxy-
(prepn. of)

RN 22699-97-4 CAPLUS

CN Methanone, (3,4-dimethoxyphenyl)(3,4,5-trimethoxyphenyl)- (9CI) (CA INDEX NAME)



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